College Education and Internal Migration in China

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Abstract

In this paper I examine the causal impact of college education on young adults cross-province migration in China using variation in number of colleges at province-cohort level. 2SLS estimates indicate that attending college significantly increases the likelihood of residing in a different province later in life by 9.1 percentage points. The results are robust to a set of specifications and tests.

Keywords: College Education, Internal Migration, China.

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1 Introduction

Mobility is an equalizing force for wages and employment (Moretti, 2011). By mobility I mean internal migration in a country, where people relocate to a different geographical unit later in life. Being able to move across geographical boundaries has large implications, including affecting housing prices (Garriga et al., 2017), improving intergenerational mobility (Derenoncourt, 2018; Nakamura et al., 2019), reducing welfare dependence (Hartley, Lamarche, and Ziliak, 2017) and income inequality (Razin and Sadka, 2016), and improving health condition (Black et al., 2015). Understanding what factors affect migration, therefore is important for both researchers and policy makers.

Among those factors it is of special interest that how college education affects migration because college educated workers are important for both local and national economy (Moretti, 2004). The conventional wisdom believes mobility rises with education (Molloy, Smith, and Wozniak, 2011), and empirical evidence found in the U.S. and Europe support this relationship (Malamud and Wozniak, 2012; Machin, Pelkonen, and Savanes, 2012; Weiss, 2015). However, the connection between education and internal migration in China is less known and perceived in part due to a large share of less educated population floating in China.[1] Several reasons can explain the lack of studies looking into this relationship. First, there is lack of data with detailed information on individual's timing of education and residence location throughout time, so it is very difficult to investigate how education affects people's mobility later in life. Instead because of the household registration system, well known as hukou, as a unique institutional feature of China was attached with each individual, it is widely available in various data sets. Since 1978 when China initiated the economic reform and opening up policy, the world has witnessed an unprecedented growth of China's economy as well as an urbanization process. More than 600 million rural people became China's urban population. Cities thrived by the rapid economic growth, in part by absorbing excess labor force from rural area, where people have less education.[2] Therefore, contemporaneous

[1] Luo and Xing (2016) find that less educated people in China are more responsive to regional demand shifts. Lu and Xia (2016) use 2010 Census data show unconditionally college workers are more likely to move intra-provincial while people without college degree are conducting more inter-provincial migration. Both papers define migration based on hukou registration place.

[2] According to the latest statistics from National Bureau of Statistics, in 2016, there are 1,382 million population, in which 792.98 million live in urban area, 589.73 million live in rural area. The urbanization rate is 57%, comparing to 17.9% in 1978 when 962.59 million population in total and 172.45 million people in urban area.

hukou migration is heavily examined in the literature. Second, the composition of long-distance migrants does not vary in education due to the small share of college educated people in Chinese population. Data from Censuses 1990 and 2000 suggest the majority of migrants are composed by people who completed education less than secondary school.[3] Since most colleges are located in cities (Xing and Zhang, 2017), seeking tertiary education in order to move to cities became one popular approach to overcome hukou barriers for young people in rural area. Because once college education is completed, it is much easier to convert hukou, therefore this mechanical relationship is less attractive to researchers.

However, China implemented an unprecedented higher education expansion in 1999, which increased the number of students enrolled in college. The enrollment rate for high school graduates jumped from less than thirty percent to more than sixty percent in 1999 and was kept at a high level and now is eighty percent. Nearly seven million college students graduate every year and it is hard to imagine the massive impact they will leave on local economy once these college students become mobile. In this paper, I take advantage of this shock and estimate the impact of college education on cross-province migration in China, including both unskilled and skilled labor.

Understanding the link between college education and mobility in China is important in several aspects. First and foremost, China is of special interest because of its unique institutional background of hukou and the size of floating population. Due to the hukou system, not only rural people but also urban hukou holders are difficult to enjoy public services from a city without the residence city hukou. Though hukou policies have been relaxed and become more flexible since 1980s, number of permanent hukou changes remains low for both educated and less educated workers (Luo and Xing, 2016). This implies more and more college people are also participating in temporary migration without converting hukou even though college degree provides a convenient path for a non-local hukou holder to earn a local urban hukou. The latest data shows in 2017 there are 244 million people residing in a place that is different from their hukou location while every year the higher education system adds 7 million college students into labor market. How do these college people choose where to live and their location choice is an important issue. Second, College workers are vital for local and national economic development and understanding how inter-province migration of educated workers is shaped by college education is important for designing

[3] Please see appendix.

local public policies. On the one hand, increasing enrollment locally could retain more college students (Groen, 2004; Winters, forthcoming), on the other hand, if college-educated workers are more responsive to labor market shocks (Wozniak, 2010), brain drain could happen to some local economies. Educated workers are attracted by different amenities (Su et al., 2017) and also make the area more desirable to live (Shapiro, 2006). There are cases in recent years where some provinces in China have a sizable higher education system but suffer losses of college graduates. Rural-urban and urban-urban migration might go beyond provincial boundaries and take time, which is less examined in the literature. It is important for local government to understand the mechanism between college education and mobility.

In this paper, I look into how college education affects people's later life location choices in China. An individual is a migrant if he/she is residing in a province that is different from his/her age of 12 province. My measure does not involve hukou status. It includes general migration for both rural-urban and urban-urban movement. OLS estimation of migration on education is biased due to omitted variables and self-selection. People who would likely to migrate also tend to earn more education. In this paper, I utilize the variation in provincial level number of colleges induced by the large expansion of higher education since 1999, to examine the impact of college on inter-province migration of young adults in China, using China Family Panel Studies (CFPS). It is the ideal dataset of this study for several reasons. First, it records adult respondent's residence location spanning between childhood and survey year. Second, it has rich information on education end year and duration so that I can back calculate the year respondents graduated from high school and went to college. Once college-going year is obtained, I am able to match the province-year number of colleges to each individual and isolate the confounding factors such as ability that will lead the estimate biased. The exclusion restriction requires later life location choice is affected by education only through college-going year number of colleges. Because college admission is province-based, if people could select into provinces with more colleges, then the identification is invalid. But due to hukou restriction, people have to take the college entrance exam in their hukou province no matter where their secondary education takes place. Selecting into advantageous provinces is unlikely in China. The other potential threat to my identification strategy is the correlation between location amenities and quantity of colleges. However, I argue that the expansion depends heavily on the existing higher education size in each province, which

is dated back to 1950s when China relocated university departments across cities out of political reasons (Glaeser and Lu, 2018). If anything, it will bias my estimates downward since a better location will attract people to stay, not to move away.

The 2SLS result shows attending college increases one's out-province migration propensity by 9.1 percentage points, which is a large effect considering the average migration rate is around 9 percent in China. The result is also robust to different measures of migration and subsample tests. Last, I go beyond and discuss several mechanisms that lead to the main results. I first examine how childhood rural/urban hukou affects inter-province migration through education. Then I look into the differential impact of college in terms of within-province and out-province hukou migration. Then I use Oaxaca-Blinder decomposition to see if higher education expansion could explain the difference between migration patterns aside age effect. These results indicate that urban residents are less likely to conduct long-distance move possiblely due to opportunity cost of change hukou associated urban amenities; college is more salient in determining cross-province hukou migration. Finally, I test if college education affects a set of personal beliefs such as family network and education, which I suspect as a channel that could influence people's later life location choices. The results show that college-educated people are more prone to disagree with the importance of family and social connections, in contrast, they are more inclined to support the idea that education is more important, which implies how college education improves people's ability to depend on themselves.

The contribution of this paper is threefold. First, to my best knowledge, this paper is the first attempt to link college education and cross-province lifetime migration in China and finds unintended consequences of higher education expansion of China.[4] Second, unlike existing studies focusing on low-skilled and hukou migration, it includes both hukou and non-hukou, skilled and unskilled labor migration and answers the question of whether people are more likely to move across provincial boundaries in a general context. Third, it adds Chinese evidence to the literature on the determinants of migration and finds a consistent story comparing to the U.S. and Europe.

The rest of the paper is organized as follows: Section 2 discusses related literature on internal migration. Section 3 introduces the institutional background of China's internal migration and

[4]Among the unintended consequences of higher education expansion, Bollinger and Hu (2017, 2018) look into wage premium effect. Ding, Lugauer, and Bollinger (2019) find increased college probability raise Chinese household saving rate. Che and Zhang (2018) and Feng and Xia (2018) find technology adoption in Chinese firms.

higher education. Section 4 presents a simple framework of migration and its implication. Section 5 describes the data and empirical strategy. Section 6 presents the main results and robustness checks. Section 7 discusses potential mechanisms. Section 8 concludes.

2 Motivation and Related Literature

There are two strands of literature focusing on different aspects of migration, typically the determinants and impacts of migration.[5] The determinant side is related to questions concerning why and who moves, which is believed to be affected by push- and pull- factors. Sjaastad (1962) was the earliest paper proposing the idea that whether an individual will move depends on the difference between the present value of income and costs of moving, where the latter includes both money and non-money costs and the migration rate increases with education and diminish with age and distance moved (Schwartz, 1976). Factors such as income (Kennan and Walker, 2011), wealth constraints (Dustmann and Okatenko, 2014), historic linkage between host and home locations (Kinnan, Wang, and Wang, 2018), number and gender of children (Huang, Lin, and Zhang, 2019), tax incentives (Agrawal and Foremny, 2019; Kleven et al., 2019), trade shocks (Greenland, Lopresti, and McHenry, 2019; Tombe and Zhu, 2019; Fan, forthcoming), welfare reform (Kaestner et al., 2003), health care (Alm and Enami, 2017), local amenities (Su et al., 2017), environmental conditions (Chen et al., 2017; Khanna et al., 2019), and cyclical factors (Saks and Wozniak, 2011).

People always move for better jobs and higher living conditions. However, the connection between education and migration is less studied in the literature. In theory, it is generally believed that mobility rises with education even though there is a secular decline in mobility in the U.S. for every demographic group (Molloy, Smith, and Wozniak, 2011, 2017), empirical evidence still finds more educated people tend to move more and take longer-distance migration. Malamud and Wozniak (2012) use the national and state-level induction risk during the Vietnam War to identify both college attainment and veteran status for men observed in the 1980 Census and examine the causal effect of education on migration using variation in college attainment. They find that an additional year of college education increases the probability of living outside one's birth state by 0.03 to 0.09 percentage points, which could account for 10 to 25 percent of the

[5] For detailed discussion of internal migration, please refer to two survey papers Lucas (1997) and Greenwood (1997) that focus on developing and developed countries respectively.

probability of moving for men in their sample. Wozniak (2010) uses local labor market demand shocks (Bartik, 1991) to examine the impact of education on mobility and finds college students are more responsive to distant labor market shocks and hence more likely to move than less educated people. Machin, Pelkonen, and Savanes (2012) use Norwegian data to examine how education affects mobility using the compulsory education reform. Weiss (2015) uses a similar identification strategy but includes more European countries. Both of the two papers find similar results in Europe. But it may not necessarily be true for more educated people because of self-selection and less-skilled workers may have stronger incentives to migrate to a location when they are rewarded more (Borjas, 1987; McKenzie and Rapoport, 2010; Xing, 2014).

Most of the researches studying China's internal migration have been focused on the rural-urban population flow and contemporaneous hukou migration because of its very unique characteristics in terms of both large rural-urban divide and mobility restriction. Even though local residence benefits are limited to people without hukou, less educated people from rural places still have large incentives to move into cities.[6] The probability of rural migrants returning to home is however increasing in education attainment, and more educated people are less likely to choose migration over local non-farm employment in order to avoid the risks associated with migration and the cost of being separated from families (Zhao, 1999, 2002).

Given the prosperous development of research on internal migration in China and its outcomes, however, there is a missing piece that lacks investigation. Because of the fact that regular higher institutions in China are located in cities (Xing and Zhang, 2017) and hukou restriction, education-based migration creates a huge incentive for skilled people to move (Liao et al., 2017). Since once a student is admitted to a college, city hukou status is automatically granted[7] and it makes staying after graduation easier. To overcome the mobility restrictions, many rural youths strategically pursue post-compulsory education. Once enrolled in college, they are automatically granted urban

[6] Zhang and Song (2003) find that rural-urban migration contributes dominantly to urban population growth and attracted by economic growth, not vice versa. Their analysis also shows that rural-urban income gap encourages interprovincial migration. Other papers that look into the wage differential, education opportunities and discrimination against migrant workers (Wang, Zhang, and Ni, 2015, Zhang et al., 2016; Pakrashi and Frijters, 2017). Shi and Bao (2007) find evidence that town in-migrants generally have higher levels of education than those of the local population and better educated people in rural area were more likely to migrate inter-provincially than shifting to non-farm sector in nearby towns. However as towns became wealthier, better educated people tend to work in towns near-by rather than migrating to other provinces.

[7] Though it is registered collectively under the residence of college, not the typical resident's hukou, it still enables students to access the public service in that city and makes them easier to stay in the city after graduation.

hukou (Pan, 2016)[8]. The great influx of college students induced by higher education expansion increased new college enrollment from 1.5 million in 1999 to 6.9 million in 2012, most of them look for a job and stay in cities after graduation.[9] The relationship between education and migration in China demands more research since the migration of college students affect the spatial distribution of human capital and it has a lot of implications on economic development and local labor market.

This paper adds to the missing piece of the linkage between education and internal migration in China. The IV estimates show a causal explanation that college education makes people more likely to reside in a different province than the childhood province. In general, attending college leads to a 9.1 percentage points increase in migration propensity.

3 Internal Migration and Higher Education in China

Before I start investigating the inter-provincial migration in China, I first introduce the institutional background of hukou and its related migration measure. Then I discuss the higher education system in China and its recent expansion.

Hukou as a unique characteristic of China's socioeconomic development was created in 1950s to restrain people from moving between rural and urban as well as different cities in order to make agricultural and industrial production under a central-planned economy. It does not only classify residents into rural and urban area, but also distinguish them between urban cities. Hukou status was attached to an individual when he/she was born, mainly following parent's hukou status. As China initiated the opening-up and reform policy in late 1970s, more and more labor have been freed from rural area and the growing urban private sector attracted increasing number of people flowing into cities. Figure 1 shows the floating population in China for the last three decades. It reflects both the relaxation of mobility restriction which leads more people to move, and the dramatic size of the population that engage in moving within China. The migration control policies were gradually relaxed to meet the demand and since 1990s people could find a job without local hukou. Even though the restrictions of moving have been lifted up after the economic reform and people are allowed to live anywhere in China nowadays, major public services such as health care

[8] Pan (2016) also finds such incentives to stay in school disappear after the removal of selective mobility restrictions.

[9] Based on a 2013 survey, 12.6 percent of college graduates migrate to a third place which is different to the origin and college locations, 11.1 percent are return migrants, 9.1 percent stick to where the college locates, and 54.3 are stayers, who learn and get employed in original area without any migration (Yue, 2014).

and public education are still only available to local hukou holders, which creates a large incentive for rural and other city hukou holders to migrate to a city with better public services. Education, joining he army, getting a job, and buying an apartment are among the most common ways one can change hukou. However, in some cases, they do not necessarily result in hukou conversion, which could be due to the stringent hukou restriction or personal choice. Therefore, given nowadays moving is more driven by market conditions, I focus on general long-distance inter-provincial migration in this paper.

Higher education in China has experienced different periods for the past few decades. The National College Entrance Exam (NCEE) is held in June every year and eligible students take the exam, receive scores, and then apply for colleges. The enrollment is mainly administered by the Ministry of Education and coordinated between provincial and central government. Admission is based on provincial basis and the number of students can be enrolled for each province depends on how many colleges a province has and the allocation between in-province and out-province quota. Students who fail to get into college can retake the exam in another year. In 1999, the central government implemented the policy to expand its higher education size to enroll more students. This expansion has led to millions of students from both urban and rural area getting into college. The enrollment rate went up dramatically in the early years of expansion and soon stabilized around 80 percent. Number of colleges also went up at the same time to meet the demand for higher education. Figure 2 plots the total number of colleges in China for each year and we can see a massive increase post 1999. Provinces had a great deal of discretion in the design and administration of their higher education institutions, and both the quantity and quality varied widely. Figure 3 shows variation in number of colleges for selected provinces over time. I take advantage of the massive policy change to estimate how college education affected young adults migration decision.

4 Model

In this section, I discuss a simple choice model related to education and moving cost following Wozniak (2010) to illustrate the possible consequences of college expansion. Consider a resident

whose childhood province is j^*, the location choice problem is:

$$\arg\max_{j\in J} U(w_j) = \arg\max_{j\in J} \left\{ \sum_t \delta(e)^t \left[\mathrm{E}(w(e)_{jt}) - c(e)_{(j,j^*)t}(1|j \neq j^*) \right] \right\} - \alpha(e)_{(j,j^*)}(1|j \neq j^*) \tag{1}$$

where w_j is the wage/consumption in province j; (j, j^*) denotes origin-destination province pair; e represents education level and t indexes time; δ is a discount factor; c is a recursive moving cost function associated with education such as travel cost back to home province and psychic cost of being away from home; α is a function of one-time moving cost also depending on education such as the opportunity cost of giving up the existing job and local amenities associated with home province hukou status.

If expected benefits from living in another province exceeds costs to moving to that province, people will make the move from j^* to j. It is straightforward to see the probability of moving is increasing in e if moving cost is decreasing in education. For instance, if cities in away provinces relax the policies on hukou as they welcome more college students, then $\partial\alpha/\partial e < 0$. To see this, assuming the wage function is a constant for each province over time and recurring cost is also constant and independent from education but one-time moving cost is decreasing in education. Then the probability of moving to another province $j \neq j^*$ is as follows:

$$\Pr(j \neq j^*) = \Pr\left[\sum_t \left(\mathrm{E}(w(e)_{jt}) - c \right) - \alpha(e) > \sum_t \mathrm{E}(w(e)_{j^*t}) \right]. \tag{2}$$

As the size of higher education in China expands, e is increasing so that $\alpha(e)$ is less than before, therefore the moving probability increases.

This simple choice model predicts that as people become more educated, the probability of migrating to another province should increase if all else equal, which offers an empirical perspective to test it.

5 Data and Empirical Strategy

5.1 Data

CFPS China Family Panel Studies (CFPS) is a widely used longitudinal survey conducted by the Institute of Social Science Survey (ISSS) of Peking University. It is the most comprehensive panel survey data covering contemporary China. The first wave started in 2010 which is the baseline sample. It records detailed information on household member residence location, education attainment level and graduation year, economic conditions such as wage, income, and non-economic outcomes including beliefs and health status. Five provinces were selected for initial sampling and other provinces were later sampled to make sure the representativeness of the country. Figure A1 in appendix shows the geographical coverage of CFPS provinces. These 25 provinces consist of 95% total population of China, which can be viewed as a representative sample of China (Xie and Hu, 2014).

Number of Colleges I collect college data for each province each year from China Yearly Statistical Book. It records the total number of regular higher institutions for each province from 1987, including two-year colleges that offer professional undergraduate degrees, which varies both cross provinces and over time. Figure 3 shows variations of number of colleges for selected provinces.

Provincial Economic Conditions In order to account for factors at provincial level that push people away, I further collect data from China Yearly Statistical Book on provincial total urban population, total number of non-farm employment, GDP per capita, and urban wage to construct provincial level economic variables.

5.1.1 Key Variables

Migration The primary interest of outcome is migration status. Measuring mobility involves defining geographic units of origin and destination locations and the time period people must move between origin and destination locations (Molloy, Smith, and Wozniak, 2011). However, defining migration in a Chinese context is more complicated. There are at least three dimensions of migration under a Chinese context: rural-urban, hukou, and general type of moving. Existing

literature focuses on the first two types in part because of the lack of information on survey respondent's residence location over time. However, CFPS enable me to examine general migration as well as the other two types due to the rich information on residence location. In this paper, I investigate general lifetime inter-province migration. It is defined as the respondent is residing in a province that is different from province in the college-going year. The latter is not known in the data set. But CFPS asks very detailed information about family member's residence province at birth, age 3, age 12, and the time of survey, I use province at age 12 as a proxy to measure province status before college-going year. Though moving between age 12 and age 18 is possible, given hukou restriction in China, this is unlikely.

Education CFPS ask detailed information on education level, duration, and completion (drop-out) year, and also provides adjusted best education level based on self-reported value from respondents and converts corresponding education level to years of schooling. I first calculate the starting year of each education level by using the end year subtracting duration. I assume college year is the same year when high school is completed for those people without college. For those people who do not finish high school, I assign age 18 to them, which is the year they became adults. Then I am able to match the college-going year with province-year level number of colleges data to exploit the variation of access to college on one's college status.

5.1.2 Sample Selection

I first drop people without detailed birth province and hukou information. I then drop individuals who took the college entrance exam prior to 1987 because the earliest information of higher education at provincial level is available from year 1987, which corresponds to the cohort of 1970 that was supposed to take college entrance exam in the same year. I also drop the cohort born after 1986, because they are supposed to take the college entrance exam after 2004, and will not be expected to graduate until 2009, when the survey was conducted. I further restrict the age of respondents when taking the survey to be between 25 and 40 so I focus on the lifetime migration decision of young adults. Lastly, I include full-sample of both urban and rural individuals, women and men.

5.1.3 Summary Statistics

Tabel 1 reports summary statistics for major variables in terms of individual's migration status and college attainment. From column (1) and (2) we see that migrants are more educated than non-migrants. The share of people ever attended college is 16% and 21.6% respectively. The share of migrants for non-college and college individuals are in column (3) and (4), 8.9% for people without any college experience and 12.4% for people with some college. Females are more likely to reside in a different province comparing to males but slightly less likely to become a college student. Migrants are younger and have fewer siblings, which is in part due to the one-child policy. The gap between non-college and college people, however, is larger, which could be associated with their rural/urban status. Marriage rate is higher for migrants and non-college people. 22.3% of migrants already enjoyed urban hukou at age 12 while the share is 21.3% for non-migrants, indicating urban and rural people have similar probabilities to perform long-distance moving. From column (3) and (4), urban children are also more likely to attend college as 53.1% of them had urban hukou at age 12.

5.2 Identification Strategy

The ordinary least squares estimation of education on migration takes the specification:

$$Mig_{ijrt} = \beta_0 + \beta_1 College_i + X'_{ijrt}\delta + \psi_{rt} + \phi_j + u_{ijrt}. \tag{3}$$

Mig_{ijrt} is equal to one if individual i from province j region r who was born in year t resides outside the age 12 province in 2010 and zero otherwise. This specification controls for many personal attributes and unobserved heterogeneity at the province and regional level. X'_{ijrt} is a vector of variables controlling for individual characteristics such as gender, number of siblings, marriage status and rural/urban hukou status at age 12 as well as a set of province economic variables to control for economic and labor market conditions of people's college-going year.. The regression also controls for age 12 region-by-cohort fixed effect ψ_{rt} and age 12 province fixed effect ϕ_j. The inclusion of ϕ_j accounts for any provincial level shocks that result in unobserved heterogeneity between people from different provinces. Because China was implementing various reforms and large national and regional projects such as the "China Western Development" in

1999 and the "Rise of Central China Plan" in 2004, region-by-cohort fixed effect ψ_{rt} will absorb such heterogeneity, which eliminate the trend at the aggregate level.

Even though I can control for many observed attributes and unobserved fixed effects, OLS estimates will still be biased and inconsistent due to remaining factors in the error term that cause the estimate biased. For example, if unobserved individual ability is positively correlated with preference for moving, which also makes the individual more motivated to get into college, then β_1 will be overestimated. On the contrary, if an individual with network in local area which enables the high school graduate to attend local college more easily, then we will have β_1 underestimated. There is no clear prior on the impact of unobserved effect on college status and in which direction it will affect future migration propensity. $College_i$ needs to be instrumented and the instrument is required to meet two conditions: correlated with college going decisions and exogenous to later life location choices through the error term. I take advantage of China's higher education expansion and use the number of colleges at province level to identify the variation in college education. I use provincial level number of colleges to instrument for college status following the spirit of Currie and Moretti (2003). $NumCollege_{jt}$ is measured by number of regular higher institutions in province j of college-going year t. It varies both cross provinces and over time. Since college status is an endogenous binary variable, I use a two-step IV method to estimate the impact of college on migration (Wooldridge, 2010). First, I estimate the binary response model of college on the set of covariates and number of colleges by probit:

$$\Pr\left(College_{ijrt} = 1 \middle| X'_{ijrt}, NumCollege_{jt}\right) = \widehat{G}. \tag{4}$$

After obtaining the fitted probabilities $\widehat{G}$, I then estimate Equation 3 by IV using instrument $\widehat{G}$, which delivers an efficient IV estimator.

I first discuss the exclusion restriction of my identification strategy and then present my first-stage estimates in the results section. The exclusion restriction requires that the number of colleges in each province has no influence on later life migration choices except through the channels of college attainment. My instrument could fail to meet this restriction if young people attempted to exploit provincial variation in college probability by moving between provinces. The first violation is unlikely because of the aforementioned hukou restriction. One can only take the college entrance

exam in hukou province, while changing hukou status is quite difficult. In my main analysis, out-of-province migration is defined as current residence province is different from the province at age 12. If some parents want to switch from a small number of colleges province to a large number of colleges province so that their children can go to college with better chance, it is not easy to achieve. In addition, even those parents manage to change hukou province, young people mainly just follow and do not make decision of where to move, so it does not affect my identification using college-year provincial variation to examine college status on those children's future migration.

The second threat is the potential correlation between the size of higher education and the preference to live. The novelty of my identification comes from variation at province-college-year level, where I assume the number of colleges only affects college attainment at year t, not in $t+k$ years, when individuals choose the location to live. But one might still argue there is a correlation between number of colleges in year t and year $t+k$, and people migrate for better amenities of education, which in part comes from k years ago the variation of college quantity. It is possible, however, will only lead to an underestimate of the impact on migration. Because I am comparing people from the same province with different education level, and if better education amenities will make such location more desirable to live, it should attract people to stay or come back to the home province, rather than move away.[10] Moreover, a recent study by Glaeser and Lu (2018) use relocation of university departments in China back to 1950s to examine the spillover effects of human capital. They argue this is affected mainly by political reasons rather than economic development. I also show the expansion is proportional to each province's existing size of higher education.

Various papers utilize hukou policy reforms at different administrative level to examine if those relaxations affect people's mobility though there is no consensus on findings.[11] If number of colleges is correlated with hukou reform, for instance, if local government endogenously relax hukou policies and construct more colleges to attract more human capital, then people from provinces with more relaxed hukou policies are also more likely to go to college. I use data

[10] Evidence can be found in Tuckman (1970) where he used state-level data to test the determinants of college migration. He found income and average price of a state are positively correlated with out-migration, and number of public colleges, which serves as a proxy for travel costs and attractiveness of state schools, reduces out-migration.

[11] Sun et al. (2011) find little evidence of hukou reform on migration. Kinnan et al. (2018) however find strong evidence on rural-urban migration. Fan (forthcoming) use city-level data and find strong evidence of hukou reform on share of local hukou holders and migration rates.

collected by Fan (forthcoming) along with number of colleges at province-year level to test if hukou reforms are correlated with college construction. Figure 4 presents the evidence that there is no clear positive correlation between these two reforms. hukou reforms do not select into those provinces with more aggressive college expansion. Again, if there exists any possible connection between these two reforms, it could only result in an underestimate of college's impact on cross-province migration.

6 The Impact of College Education on Cross-Province Migration in China

This section reports the main findings by estimating Equation 3 via ordinary least squares and instrumental variables. Based on the estimates, attending college leads people 9.1 percentage points more likely to reside in a province that is different from age 12 province. The results are robust to a series of tests.

6.1 Main Estimates

The main results are presented in Table 2. Column (1) to (3) report estimates for Equation 3. Individuals with some college on average are 2.8 percentage points more likely to move out of their childhood province. Males are less likely to migrate comparing to females with a coefficient of -2.6 percentage points, possibly through marriage channel. Chinese females are commonly following their husbands to relocate, therefore we see the differences between gender. More siblings create a higher probability for individuals to migrate out of their childhood place. They can afford to leave because their siblings could share the responsibility to co-reside with parents and provide old-age support. This is consistent with what Ma and Wen (2016) found that the probability of co-residence is positively associated with relative education of the children when parents can provide help but negatively associated with education when parents need help. Married people are more likely to live outside their age 12 provinces. Parental education affects migration differentially. There is no significant impact of childhood urban hukou status while people who live in urban are more likely to be a migrant, which is not surprising considering the one-way traffic of urbanization of China. Push factors at provincial level have quantitatively large but not statistically significant impact on

moving except for GDP growth rate. However, the signs are consistent with the intuition that the more rapid local economy is growing in the home provinces, and the more local jobs are available, the less likely people will migrate out.

The 2SLS estimates are presented in column (4) through (6) with the corresponding first-stage results in Table 3. Dependent variables in Table 3 are college status with one being having attended any college. Every regression controls for age 12 region-by-birth cohort fixed effect and age 12 province fixed effect. Column (3) is the preferred specification where I control for both individual demographic variables and college-going year provincial economic conditions. The control variables show that men are more likely to go to college. More siblings will lead to lower probability of college, which is consistent with quantity and quality trade off theory (Becker and Lewis, 1973). Urban children are more likely to attend college and the difference is 15.6 percentage points between people with urban hukou at age 12 and without. The MOP effective F statistics are reported in the bottom of the table and indicate the instrument has good power.[12]

The set of control variables in Table 2 have similar signs and magnitudes in both OLS and IV regressions. The IV estimate for college is larger than OLS and is statistically significant at 5% level. College experience will make people 9.1 percentage points more likely to migrate out of province comparing to non-college people, which is a large effect. Considering the mean migration rate is only 9 percent, college doubles the migration propensity. It is smaller than what Malamud and Wozniak (2012) found in the U.S. that attendance and completion of college increase out-of-state migration for men by 20.1 and 24.1 percentage points if using national induction risk,[13] but still quite interesting to see that college education increases the probability to migrate in China given the sheer differences in terms of culture of moving and hukou restriction.

[12] Please see Andrews, Stock, and Sun (forthcoming) for a discussion of weak instrument and first stage F statistics. They derive if there is only one endogenous variable, the Kleibergen-Paap robust F statistic is equivalent to the MOP effective F statistic (Montiel Olea and Pflueger, 2013).

[13] Their definition of migration is based on birth place where I use more finer measure to reduce the overestimation of college's impact. Also, their sample only includes men who are considered to be affected by induction risks. I use a sample of both men and women. The subsample test of gender are presented in appendix. It actually shows a higher impact of education on female. College increases women's out-province migration rate by 16.2 percentage points while men are only 10.5 percentage points, though not statistically significant.

6.2 Robustness Checks

In this section I conduct a host of robustness checks using different measure and subsample of CFPS data to examine the impact of college education on cross-province migration in China. The results support the main estimates.

First, I examine the impact of college on birth province migration. Recall that in the main analysis, my definition of out-of-province migration is based on age 12 province. Following Malamud and Wozniak (2012) I change the home province measure of migration from age 12 province to birth province. Even though moving during childhood is less frequent especially under the Chinese context, and as stated previously that it could only lead to an underestimation of the impact, it is still interesting to see the effect of college and whether it follows the prediction. I use the same set of variables to control for individual background characteristics and college-going year provincial economic conditions except for hukou. I replace the status at age 12 in the main regression with status at age 3 because it is closer to the birth time. I also change the fixed effect into birth province and birth region-by-cohort fixed effects. The result is shown in column (1) of Table 4. People with college education are 9.4 percentage points more likely to migrate to a different province in their mid-ages, comparing 9.1 percentage points of main results, the estimate is slightly larger because it includes those people who have changed residence province between birth and age 12.

What is driving the impact of college on inter-provincial migration in China? Is it because the regional disparity that more educated people have been moving from the west and central areas to the coastal region and more developed provinces in east China attract more college students? Figure 5 shows the geography of cross-province migration in China based on share of in-migrants to current native residents calculated from CFPS data. As we can see from this figure, Beijing and Shanghai as the two largest municipalities are very diversified and have been long attracting people to move in [14]. Other dark regions such as Guangdong, Zhejiang, and Jiangsu are also east and coastal provinces. I conduct a series of test to see if migration pattern is shaped by star provinces and east region. I first exclude people who are living in Beijing and Shanghai and the result is shown in column (2). There are 10 percent of the sample from Beijing and Shanghai, but the

[14] Chongqing became independent from Sichuan after 1998, therefore also consists a large share of "migrants" if people who were born in Sichuan and live in Chongqing now.

estimate hardly changes from the main regression. It implies that even though people are moving into these two cities, college does not make moving into these two cities more likely comparing to other places. There are similar movements induced by college education taking place in the rest of China as well. I further drop people who are residing in the east region, the coefficient actually is raised to 16 percentage points, higher than the whole sample. The impact of college education on inter-province migration is more pronounced in inland China. It is quite contrast to the common perception of "peacock flies southeast",[15] which people use to describe the direction of population flow of skilled labor in China. However, it does not contradict the phenomenon because both unskilled and skilled labor are moving into east region. The estimates are only reflecting the relative role of education in out-of-province moving but not capturing the aggregate population stock change.

Lastly, I limit my sample to people who at least graduated from high school. Column (4) shows that college people are 14 percentage points more likely to migrate out comparing to people with high school education. Because I assign the college year as age 18 to those people who do not have high school degree, this underestimates the impact of college education by placing it on lower skilled people. Therefore the college effect is higher for marginal people.

7 Mechanism

The empirical results evidently reveal a causal relationship between college education and long-distance move in China and are surprisingly close to the U.S. In this section, I propose and explore several explanations behind education and cross-province moving in China. First, I investigate how hukou system distorts the impact of college on inter-provincial migration. The estimates show that hukou lowers the propensity of out-of-province migration in general but has differential impact on people with different education level. Then I utilize several questions in the CFPS survey to examine how beliefs on family and social networks are affected by college education, and hence connected with migration propensity.

[15] The *Peacock Flies Southeast* is the first narrative poem in Chinese history.

7.1 Hukou Restriction

Rural/Urban Origins Rural-urban migration has been heavily examined in the literature and considered as a large contribution to urbanization of China (Zhang and Song, 2003; Chan, 2008; Liao et al., 2017). Since most unskilled labors come from rural area and make up the majority of floating population, it draws a lot of attention where urban-urban migration has received less focus.[16] However, as depicted by Figure 6, there exists an increasing gap of college opportunities between rural and urban China. If college education affects mobility and access to college is easier in urban area, we should see higher mobility among urban residents because inverse-migration (urban to rural) is less likely and observed in data. Table 5 shows the estimates after I split the sample into two groups which include people with at least high school degree who were holding rural and urban hukou at age 12 respectively. Strikingly, college affects long-distance move for rural people more significantly than urban counterparts. A rural student who receives college education is 12.2 percentage points more likely to move out of province comparing to rural people without college experience while urban people both college educated and not are not statistically different in cross-provincial movement. One potential explanation for this is due to the hukou system. The opportunity cost of converting from one urban city to another is higher than from rural to urban, since people have to give up a lot of amenities associated with old hukou, which offsets the college effect on long-distance moving. Another possibility is the local labor market absorb rural people within the same province first. The impact from GDP growth rate speaks for such effect. It places a strong negative effect on out-province migration for rural children, which implies that rural children with college education are attracted to relocate to urban area within the same province first. When they flood in and take jobs in urban, it pushes local urban people to migrate out. An increase in urban job opportunity will lead to 9.2 percentage points higher probability of moving out for urban children when they have college education.

Hukou Migration Throughout this paper I use current residence province and childhood province to define cross-province migration. As discussed earlier in this paper, another commonly used measure of migration in China is hukou migration. Moving within China has been increasingly popular while changing hukou status is not as easy as moving between locations.

[16] One paper Ye et al. (2016) looks into this issue with a focus on high-skilled labor migration in China.

hukou system assigns both rural/urban classification and administrative city. There are different measures of hukou migration in terms of rural-urban migration as well as within- and cross-province hukou migration. If college probability is positively correlated with general migration, it should also affect hukou migration but with smaller magnitude because of such restriction adds additional moving cost. Table 6 follows this idea and report two estimates based on different types of hukou migration.

I construct two new outcome migration variables, HK_{in} and HK_{out}. They are obtained by matching one's current hukou location with birth hukou location. Notice this measure does not require people staying at the current registered hukou location. One could have a registered Beijing hukou when he or she was born and never changed it, but is living in Shanghai now. This individual in the main analysis will be defined as a migrant but will not be treated as migrant in this case since the registered hukou location has not changed. As long as the two hukou cities do not match with each other within a provincial administrative boundary, this respondent then is a in-province migrant. If the current hukou city is in a different province from birth city province, he or she will be labeled as a out-birth hukou province migrant.

Column (1) only includes individuals who are staying or moving within birth hukou provinces. I do not include people who moved hukou out of birth hukou province. $HK_{in} = 1$ if respondent's hukou is associated with a different city. I add back those people who moved hukou out of their birth provinces in column (2). In this case, $HK_{out} = 1$ if people changed hukou out of birth hukou province and $HK_{out} = 0$ for both people staying in the same city and people who were moving within birth hukou province.

The coefficients for college in both regressions are similar but out-province hukou migration has smaller estimate than the main regression of general cross-province migration. Since applying hukou conversion usually happens after living in a place for a period of time, having a job, and owning an apartment, converting hukou adds extra cost to the hukou migration which lowers the probability impact of college. Because residing and working in a city is practically unconstrained, we see a higher impact of college on general migration, which is more driven by the labor market force rather than local amenities associated with hukou status. This also implies that college students are more responsive to labor market shocks (Wozniak, 2010). College has a statistically significant impact on out-province hukou migration comparing to in-province hukou migration

even though the magnitudes are close. It is possible because cities expand by absorbing surrounding rural area first in the early stage and people know cities closer to their birth place within a province better than cities far away from another province. It is easier for less skilled people to get a job and settle down in a more integrated market within a short distance range. Therefore we observe such a less significant impact of college on in-province *hukou* migration.

This set of results first identifies that different original location generates differential impact of college on cross-province migration because the unequal access to college education. Second it shows distortion role of hukou on internal migration, which lowers the propensity of people with college experience to overcome the barrier compared with regular moving. As discussed earlier, hukou reforms do not select into provinces with more rapid higher education expansion and explain very little of the variations in number of colleges. In addition, hukou policies in the sample period do not discriminate people based on original province. If hukou policies favor college students more, then all else equal people with college education could be more able to obtain hukou, therefore they are more likely to move out of their childhood province.

7.2 College Expansion

Table 7 further shows the results after I divide the sample into people whose college year was before and after the 1999 college expansion. As can be seen from the coefficients for college, those people who hold college degree that were affected by the expansion are not only more likely to migrate out comparing to non-college people, but in an increasing rate. This sheds light on the potential mechanism that college education provides access to a variety of things that will open the world for people, such as diversity of people from different background. I decompose the migration rate difference between the two groups (Oaxaca, 1973; Blinder, 1973).[17] Let us rewrite the migration equation as follows:

$$M_i^s = \beta_0^s + \sum_k \beta_k^s X_{ik}^s + \epsilon_i^s, \tag{5}$$

[17] Colas and Ge (forthcoming) use two censuses from 1990 and 2005 to decompose the migration rates time difference. Here I decompose the cross-sectional difference between two groups of people in year 2010.

where X_i^s is a vector of individual characteristics including college education dummy, age, male dummy, number of siblings, marital status, parental education, age 12 urban hukou dummy, and urban sample dummy along with age 12 province and college year dummies. $s \in \{0,1\}$ represents college year before and after the expansion. The difference between migration probability from years before expansion $s = 0$ and after the expansion $s = 1$ can be written as

$$\overline{M^1} - \overline{M^0} = \left(\hat{\beta}_0^1 - \hat{\beta}_0^0\right) + \left(\sum_k \hat{\beta}_k^1 \overline{X_k^1} - \sum_k \hat{\beta}_k^1 \overline{X_k^0}\right). \tag{6}$$

$\overline{M^0}$ and $\overline{M^1}$ are average cross-province migration rates for people whose college year are before and after the expansion in year 2010. $\left\{\hat{\beta}_0^0, \hat{\beta}_0^1\right\}$ capture the estimated constant terms. $\left\{\overline{X_k^0}, \overline{X_k^1}\right\}$ are the mean values of the kth regressor, and $\left\{\hat{\beta}_k^0, \hat{\beta}_k^1\right\}$ are the estimated coefficients for the corresponding covariates.

Then Equation 6 can be rewritten as

$$\overline{M^1} - \overline{M^0} = \underbrace{\sum_k \hat{\beta}_k^* \left(\overline{X_k^1} - \overline{X_k^0}\right)}_{\text{Explained}} + \underbrace{\sum_k \left[\left(\hat{\beta}_k^1 - \hat{\beta}_k^*\right)\overline{X_k^1} + \left(\hat{\beta}_k^* - \hat{\beta}_k^0\right)\overline{X_k^0}\right] + \left(\hat{\beta}_0^1 - \hat{\beta}_0^0\right)}_{\text{Unexplained}}, \tag{7}$$

where $\hat{\beta}_k^*$ are the estimates from the pooled regression using the whole sample. Then the average migration rate difference is decomposed into two components. The first term on the right hand side corresponds to the part that can be explained by the change in observed individual characteristics $\overline{X}$ such as more education and younger age. The second term represents the part of change in migration rate that is caused by change in estimates, which are considered to be "unexplained". For instance, if college expansion on average increases the later cohort education level and people with higher education level are more likely to migrate, then we would expect to see contributions in the first term.

Table 8 illustrates the decomposition results of change in migration probability for people whose college year were before and after the expansion. I also calculate the contribution of changes of individual characteristics as well as changes in coefficients. It is natural to think that the two groups differ greatly in age, therefore it is the single most important factor explaining the change in migration probability. However, observed college education accounts for 45.5 percent of migration

rate difference where the unobserved change in coefficients contributes 81.8 percent. It suggests the higher education expansion does not only bring more people to college, but also change the migration behaviors.

7.3 Beliefs in Family Network, Social Connections, and Education

College time is one of the most critical period of one's life in shaping individual's view of the world and society. It does not only affect those people who attend college, but also pass onto next generations (Roland and Yang, 2017). If attending college makes people more able to work and live life on their own, then they will be less reliant on family ties, and hence are more likely to reside in different places than family location.

I first look into how people's belief of the importance of family network on one's success. CFPS survey asks adult respondents how much they agree with the following question related to the attitude towards success, which is "the most important factor affecting one's future success is whether his/her family has connections". Six choices are presented, ranging from "strongly disagree", "disagree", to "agree", "strongly agree", and "neither agree nor disagree" and "do not know". In addition, there is also a set of questions related to whether respondent had experiences such as unfavorable policies, unjustly treated by income, household registration type and gender, unreasonably delays and stalling, and being charged unreasonably when going to government offices for business.

If an adult respondent believes that family connection is the most important factor affecting success, then we should predict he or she is less likely to move away from home location since family network mainly stays and grows locally. Regardless of where education takes place, they expect to return to home location to take advantage of family network so that they can achieve better outcomes in their life. In contrast, if receiving more education makes them to compete mainly through skills and ability, then they would rely less on family resources and hence less likely to agree with such statement. All else equal, opportunity outside family influences will attract more college people. There are also two related questions asking if respondent believes "the higher level of education one receives, the higher the probability of his/her future success" and "in today's society, having social connections is more important than having individual capability". Combining these three questions, I can examine one potential mechanism that college education

affects migration through growing individual's ability and shaping personal beliefs.

I construct new variables called Att_{ijrc}, which represents the answers from respondent i from province j, region r, and cohort c. It equals 1 if answers "agree" or "strongly agree" to those attitudes questions and 0 if answers "strongly disagree" or "disagree". Indifferent people are dropped for analysis.I test whether college education affects individual's belief on family network, education and social connections via the following regression:

$$Att_{ijrt} = X'_{ijrt}\beta + Z'_i\delta + \pi College_i + \theta_{rc} + \gamma_j + u_{ijrc}. \tag{8}$$

X_i is a set of control variables as in the main regression. Z_i represents the answers to questions related to experiences. $College_i$ is instrumented by number of colleges and parental education levels. θ_{rc} accounts for region-by-cohort fixed effect and γ_j controls for age 12 province fixed effect. π delivers the impact of college education on personal beliefs.

The regression results are presented in Table 9. In the first column, the coefficient on college status is negative and also statistically significant, implying people with college experience are less reliant on family network. Interestingly, the experience of delays and stalling has the largest magnitude and statistical significance level, which meets the intuition that people who have difficulties in doing business with government are more likely to agree family network could help them succeed. Controlling for those variables, college is still playing an important role in shaping people's beliefs, which could affect one's attitude on migration. In column (2), where I further test people's beliefs on education, I find that there is not much difference between college and non-college people agreeing with the statement that higher education level makes people more likely to succeed. But college people are more likely to agree that education is more likely to bring success. The last column uses people's attitude on social connection as dependent variable and I still find that people with college are more likely to disagree with social connection is more important than individual ability. All three regressions provide evidence that college education has a profound influence that shapes individual's beliefs.

7.4 Informal Borrowing

Migration incurs both monetary and psychological costs, which will affect people's ability to move. Cai (forthcoming) found access to credit increases migration in a randomized controlled trial (RCT) in rural China, especially in villages with low levels of assets and high migration costs. College could affect people's credit conditions directly through better job and higher wage offer. Because educated people are more likely to earn more, it helps them save and accumulate wealth. Moving to a different place may not necessarily involve formal borrowing from financial institutions. Often times people who choose to migrate needs to set up an upfront cost. Therefore the ability to borrow may affect people's migration propensity.

Testing the impact of liquidity constraint on migration is difficult because asset questions are not always available in most survey data. It is also hard to identify the timing of migration and credit condition at the incidence without detailed information. However, CFPS provide questions related to borrowing and lending behaviors, and those questions only are asked for adult respondents, which will be after college time. I can then examine the impact of college education on people's borrowing behaviors.

Specifically, I classify people into two groups by a dummy variable *Borrow*. $Borrow = 1$ for those people who asked help for money regardless whether they successfully did. Other people fall into the unconstrained group. Following previous specification, I run the regression below to see if college education makes people more likely to borrow:

$$Borrow_{ijrt} = W'_{ijrt}\beta + \phi College_i + \theta_{rc} + \gamma_j + u_{ijrt}. \tag{9}$$

College is usually instrumented. If $\phi < 0$, it implies liquidity conditions are better for people with college experience since they are less likely to borrow from others. Column (1) of Table 10 provides such evidence that college education reduces borrowing behaviors. It could be because they have better wages and income so that they do not face constraints. Further, I combine a second question which asks if respondent has ever lent out money to other people. Using this as the dependent variable, I find there is no significant impact of college on lending behaviors in column (2). Conditional on income and other observables, college and non-college people are equally likely asked to lend money. I then construct a new measure of borrowing constraint variable, it is equal

to one if people only borrow from others but are never asked to lend money. The estimate is shown in column (3). College people are 8.9 percentage points less likely to be constrained, which implies that they are not constrained.

8 Conclusion

In this paper, I use variation in number of colleges in each province and college year level to instrument for people's college attendance and analyze its impact on cross-province migration in China. Unlike existing literature, I include both rural-urban and urban-urban migration as well as hukou and non-hukou migration to see the general effect of college. The 2SLS estimates show that attending college will increase residing in a province that is different from childhood province by 9.1 percentage points. The effect is large as it doubles the average cross-migration rate in China but consistent with what has been found in the U.S. literature. A series of tests show that cross-province is not one-way traffic from inland China to costal region. Actually, the impact of college on less developed area is more pronounced in making people move inter-provincially. However, urban local hukou holders are not affected by college on moving over provincial boundaries, mainly due to the migration cost of giving up benefits associated with existing hukou. High skilled people are more likely to change hukou both within- and out- province but more significant impact is found in out-province. Younger people sure have higher mobility than older cohort, but the college expansion likely affected a lot of unobserved factors related to education and changed people's migration pattern. I test how college shape personal beliefs on family network and education out of hypothesis that people who rely less on family resources are more likely to conduct long-distance move. The results indicate people who receive college education disagree that family network is the most important factor affecting success. Instead, they are more prone to agree more education is more important though there is no significant difference between them and non-college people. Finally, because migration incurs up-front costs and moving does not necessarily involve formal borrowing from banks. I test if college affects people's informal borrowing behaviors and find strong negative effect. This paper adds to the missing piece of linking education and internal migration of China and provides evidence that college education makes people not only more educated, but also more mobile, in a Chinese context.

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9 Tables

Table 1: Summary Statistics

	Non-migrant	Migrant	Non-college	College
Migrant			0.089	0.124
			(0.285)	(0.330)
College	0.160	0.216		
	(0.366)	(0.412)		
Male	0.521	0.410	0.508	0.524
	(0.500)	(0.492)	(0.500)	(0.500)
Birth year	1976.9	1977.5	1976.8	1978.0
	(4.670)	(4.532)	(4.652)	(4.563)
Age	33.08	32.49	33.23	31.98
	(4.667)	(4.534)	(4.650)	(4.556)
College age	18.55	18.48	18.24	20.10
	(1.727)	(1.592)	(0.991)	(3.155)
Married	0.898	0.913	0.919	0.797
	(0.303)	(0.283)	(0.273)	(0.403)
No. siblings	2.015	1.918	2.154	1.256
	(1.509)	(1.524)	(1.512)	(1.260)
Mother years of schooling	4.104	4.998	3.555	7.353
	(4.259)	(4.374)	(3.966)	(4.383)
Father years of schooling	6.417	7.043	5.881	9.448
	(4.299)	(4.584)	(4.154)	(3.944)
Urban hukou at age 12	0.213	0.223	0.152	0.531
	(0.410)	(0.417)	(0.359)	(0.499)
Urban	0.558	0.795	0.516	0.905
	(0.497)	(0.404)	(0.500)	(0.294)
Observations	5,337	561	4,924	974

Note: This table shows summary statistics of sample from CFPS 2010 for main analysis. Standard deviations are in parentheses.

Table 2: Main Result

	(1) OLS	(2) OLS	(3) OLS	(4) IV	(5) IV	(6) IV
College	0.044***	0.029*	0.028*	0.056	0.089**	0.091**
	(0.016)	(0.016)	(0.016)	(0.041)	(0.044)	(0.045)
Male		-0.026***	-0.026***		-0.027***	-0.027***
		(0.007)	(0.007)		(0.007)	(0.007)
No. siblings		0.009***	0.009**		0.009***	0.009***
		(0.003)	(0.003)		(0.003)	(0.003)
Married		0.029**	0.028**		0.034**	0.033**
		(0.014)	(0.014)		(0.014)	(0.014)
Mother years of schooling		0.003**	0.003**		0.002	0.002*
		(0.001)	(0.001)		(0.001)	(0.001)
Father years of schooling		0.000	0.000		-0.000	-0.001
		(0.001)	(0.001)		(0.001)	(0.001)
Urban hukou at age 12		-0.014	-0.014		-0.023	-0.024
		(0.015)	(0.015)		(0.016)	(0.016)
Urban		0.054***	0.054***		0.049***	0.048***
		(0.010)	(0.010)		(0.011)	(0.010)
GDP growth rate			-0.270*			-0.239
			(0.152)			(0.155)
Urban employment to population ratio			-0.102			-0.179
			(0.201)			(0.209)
Wage growth rate			0.198			0.174
			(0.174)			(0.172)
Observation	5,262	5,262	5,262	5,262	5,262	5,262

Note: Dependent variable is dummy variable of cross-province migration (mean=0.09). Age 12 region by birth cohort fixed effect and age 12 province fixed effect are included. Robust standard errors are clustered at age 12 province by cohort level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 3: First-Stage Result

	(1)	(2)	(3)
$\widehat{G}$	1.207***	1.213***	1.207***
	(0.132)	(0.073)	(0.074)
Male		-0.003	-0.003
		(0.011)	(0.011)
No. siblings		0.002	0.002
		(0.004)	(0.004)
Married		0.021	0.022
		(0.024)	(0.024)
Mother years of schooling		-0.002	-0.002
		(0.002)	(0.002)
Father years of schooling		-0.002	-0.002
		(0.002)	(0.002)
Urban hukou at age 12		-0.035	-0.034
		(0.024)	(0.024)
Urban		-0.019	-0.018
		(0.012)	(0.012)
GDP growth rate			0.085
			(0.249)
Urban employment to population ratio			-0.282
			(0.383)
Wage growth rate			-0.068
			(0.261)
Observations	5,262	5,262	5,262
Kleibergen-Paap rk Wald F statistic	83.436	273.288	265.554

Note: Dependent variable is college dummy. Age 12 region by birth cohort fixed effect and age 12 province fixed effect are included for each specification. Robust standard errors are clustered at age 12 province by cohort level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 4: Robustness Check

	(1) Birth Migration	(2) Drop Beijing and Shanghai	(3) Drop east region	(4) High school & College
College	0.094*	0.093**	0.160**	0.140*
	(0.053)	(0.045)	(0.068)	(0.074)
Male	-0.033***	-0.028***	-0.032***	-0.031**
	(0.008)	(0.007)	(0.010)	(0.014)
No. siblings	0.011***	0.009***	0.008*	0.008
	(0.004)	(0.003)	(0.004)	(0.006)
Married	0.025	0.034**	0.039*	0.055**
	(0.016)	(0.014)	(0.020)	(0.026)
Mother years of schooling	0.002*	0.002*	0.002	0.000
	(0.001)	(0.001)	(0.002)	(0.002)
Father years of schooling	-0.001	-0.001	-0.001	0.002
	(0.001)	(0.001)	(0.002)	(0.002)
Urban hukou at age 3	0.001			
	(0.018)			
Urban hukou at age 12		-0.024	-0.041*	-0.034*
		(0.016)	(0.022)	(0.020)
Urban	0.048***	0.049***	0.051***	0.080***
	(0.011)	(0.011)	(0.016)	(0.020)
GDP growth rate	-0.348**	-0.251	-0.172	0.224
	(0.166)	(0.162)	(0.232)	(0.216)
Urban employment to population ratio	0.681*	-0.211	0.115	-0.459
	(0.409)	(0.224)	(0.515)	(0.304)
Wage growth rate	0.224	0.182	0.134	-0.529*
	(0.183)	(0.177)	(0.242)	(0.282)
Observation	5,263	4,926	3,596	1,863
Kleibergen-Paap rk Wald F statistic	277.737	262.202	200.379	46.307

Note: This table use alternative specifications to examine robustness of main model. Column (1) drops individuals who were born in Shanghai or Beijing. Column (2) drops people who were born in the east region, which includes not only Beijing and Shanghai, but also other coastal provinces. Birth region by cohort fixed effect and birth province fixed effect are controlled in column (1). Other three specifications control for corresponding fixed effects at age 12. Robust standard errors are clustered at province by cohort level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 5: Impact of College on Cross-Province Migration for Different Childhood hukou Status

	(1) Rural	(2) Urban
College	0.122**	0.044
	(0.062)	(0.056)
Male	-0.020**	-0.030**
	(0.009)	(0.013)
No. siblings	0.012***	-0.013
	(0.003)	(0.009)
Married	0.027	0.040**
	(0.017)	(0.018)
Mother years of schooling	0.002	0.003
	(0.001)	(0.003)
Father years of schooling	-0.001	0.001
	(0.001)	(0.003)
Urban hukou at age 12	0.266	-0.112
	(0.170)	(0.454)
Urban	0.046***	0.029
	(0.011)	(0.038)
GDP growth rate	-0.292*	0.045
	(0.176)	(0.332)
Urban employment to population ratio	-0.394	0.092
	(0.252)	(0.461)
Wage growth rate	0.281*	-0.115
	(0.169)	(0.469)
Observation	4,112	1,120
Kleibergen-Paap rk Wald F statistic	114.614	84.082

Note: This table provides IV estimates people with at least high school education from different childhood hukou status. Column (1) uses people whose age 12 hukou was rural. Column (2) uses people whose age 12 hukou was urban. Age 12 region by cohort fixed effect and age 12 province fixed effect are included. Robust standard errors are clustered at age 12 province by cohort level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 6: In- and Out-Birth Hukou Province Migration

	(1) In-province	(2) Out-province
College	0.092	0.089**
	(0.058)	(0.040)
Male	-0.026**	-0.035***
	(0.012)	(0.007)
No. siblings	-0.001	0.009***
	(0.005)	(0.003)
Married	0.025	0.029***
	(0.019)	(0.011)
Mother years of schooling	0.001	0.002**
	(0.002)	(0.001)
Father years of schooling	-0.000	-0.001
	(0.002)	(0.001)
Urban hukou at age 12	-0.063***	-0.004
	(0.022)	(0.016)
Urban	0.042***	0.014*
	(0.016)	(0.008)
GDP growth rate	-0.275	-0.104
	(0.189)	(0.147)
Urban employment to population ratio	-0.045	0.931***
	(0.245)	(0.315)
Wage growth rate	0.091	0.052
	(0.215)	(0.171)
Observation	4,915	5,200
Kleibergen-Paap rk Wald F statistic	240.487	274.224

Note: This table provides IV estimates for alternative measures of migration. Column (1) uses within-birth hukou province migration (12.54% people changed hukou across different cities within a province). It excludes those people whose hukou location is outside birth hukou province. Column (2) uses out-birth hukou province migration (5.47% people changed hukou to another province). Birth region by cohort fixed effect and birth province fixed effect are included. Robust standard errors are clustered at birth province by cohort level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 7: The Differential Impact of College Education on Migration before and after Expansion

	(1) Cohort before expansion	(2) Cohort after expansion
College	0.084	0.186**
	(0.054)	(0.085)
Male	-0.026***	-0.025**
	(0.010)	(0.012)
No. siblings	0.007**	0.021***
	(0.004)	(0.007)
Married	0.031*	0.038*
	(0.017)	(0.022)
Mother years of schooling	0.000	0.003
	(0.001)	(0.002)
Father years of schooling	0.001	-0.004*
	(0.001)	(0.002)
Urban hukou at age 12	-0.027	-0.036
	(0.019)	(0.026)
Urban	0.044***	0.056***
	(0.012)	(0.020)
GDP growth rate	-0.071	-1.175
	(0.190)	(0.865)
Urban employment to population ratio	-0.257	-1.452**
	(0.380)	(0.723)
Wage growth rate	0.087	0.169
	(0.193)	(0.404)
Observation	3,459	1,717
Kleibergen-Paap rk Wald F statistic	231.373	93.405

Note: This table presents IV results of college education on cross-province migration for people who went to college before and after 1999 the expansion of higher education. Age 12 region by cohort fixed effect and age 12 province fixed effect are included. Robust standard errors are clustered at age 12 province by cohort level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 8: Decomposition of Changes in Migration Probability

	Change in migration probability	Contribution to total change (%)
Total change	1.1	100.0
Explained		
College	0.50	45.5
Age	2.90	263.6
Gender	0.00	0.0
No. siblings	-0.90	-81.8
Marital status	-0.40	-36.4
Mother's education	0.50	45.5
Father's education	0.00	0.0
Urban hukou	-0.00	0.0
Urban	0.30	27.3
Total explained change	2.30	209.1
Unexplained		
College	0.90	81.8
Age	-0.10	-9.1
Gender	-0.80	-72.7
No. siblings	1.50	136.4
Marital status	-1.00	-90.9
Mother's education	1.40	127.3
Father's education	-1.80	-163.6
Urban hukou	0.40	36.4
Urban	0.80	72.7
Total Unexplained	-1.20	-109.1

Note: This table shows the results of decomposition of changes in migration probability between people whose college year were before and after 1999. Age 12 province and college year fixed effects are controlled and normalized so the reference group will not affect results.

Table 9: IV Results of College Education on Personal Beliefs

	(1) Family Network	(2) Education	(3) Social Connections
College	-0.104*	0.076	-0.045
	(0.059)	(0.075)	(0.090)
ExpPolicy	0.022	0.007	0.033
	(0.022)	(0.025)	(0.023)
ExpRich	0.044*	-0.016	0.000
	(0.025)	(0.017)	(0.013)
ExpHukou	0.041	-0.030	0.005
	(0.029)	(0.030)	(0.028)
ExpGender	-0.036	-0.021	0.035
	(0.043)	(0.034)	(0.023)
ExpGov	-0.011	-0.029	0.015
	(0.029)	(0.022)	(0.016)
ExpConf	-0.013	-0.020	0.048*
	(0.038)	(0.024)	(0.025)
ExpDelay	0.078***	-0.000	-0.005
	(0.025)	(0.021)	(0.027)
ExpFees	0.012	0.041	0.057***
	(0.023)	(0.026)	(0.021)
Observation	4,771	4,866	4,926

Note: This table shows IV results of college education on attitudes. Number of colleges and parental education levels are used as instruments. Individual characteristics such as gender, marital status, number of siblings, childhood hukou status, current urban/rural location, and income status are included but not listed. Experiences such as unfavorable policies (ExpPolicy), mistreated by poor and rich status (ExpRich), mistreated by hukou status (ExpHukou), mistreated by gender (ExpGender), mistreated by government policy (ExpGov), having conflict with government (ExpConf), experiencing delays when doing business with government (ExpDelay), and being charged unreasonable fees (ExpFees) are reported. Age 12 region by cohort fixed effect and province at age 12 fixed effect are also controlled. Robust standard errors are clustered at age 12 province by cohort level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 10: Impact of College Education on Informal Borrowing

	(1) Ever borrowed	(2) Ever lent out	(3) Only ever borrowed
College	-0.173***	-0.027	-0.089*
	(0.066)	(0.073)	(0.054)
Income	0.009**	0.023***	-0.005*
	(0.004)	(0.005)	(0.003)
Male	0.132***	0.102***	0.018
	(0.016)	(0.016)	(0.013)
No. siblings	0.029***	0.008	0.015***
	(0.007)	(0.006)	(0.006)
Married	-0.006	-0.021	-0.008
	(0.028)	(0.027)	(0.019)
Mother years of schooling	-0.002	-0.001	-0.002
	(0.002)	(0.002)	(0.002)
Father years of schooling	-0.001	0.004	-0.002
	(0.002)	(0.002)	(0.002)
Urban hukou at age 12	-0.015	-0.044*	0.021
	(0.026)	(0.025)	(0.020)
Urban	0.001	-0.027	0.018
	(0.019)	(0.018)	(0.015)
Observation	5,256	5,256	5,256

Note: This table presents estimates of Equation 9. Number of colleges is used as instrument in the first stage probit. Age 12 region-by-cohort fixed effect and age 12 province fixed effect are included. Annual income is measured by 10,000 yuan. College-year provincial economic variables are not reported. First stage F statistic is 229.703. Robust standard errors are clustered at age 12 province by cohort level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

10 Figures

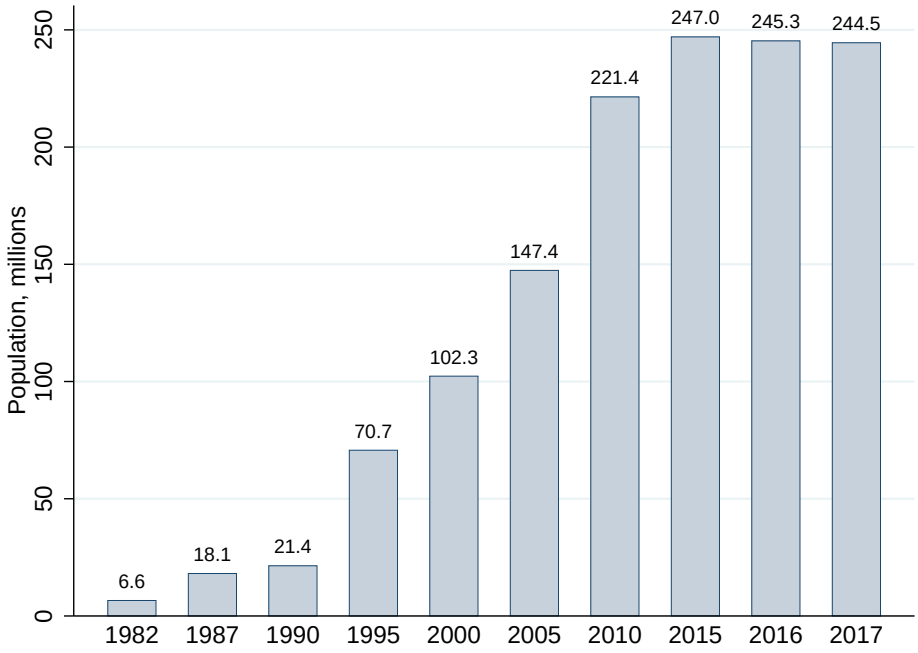


Figure 1: China's Migration Population, 1982-2017

Notes: This figure plots China's migration population from 1982 to 2017. Data is from 2018 China Migration Population Development Report.

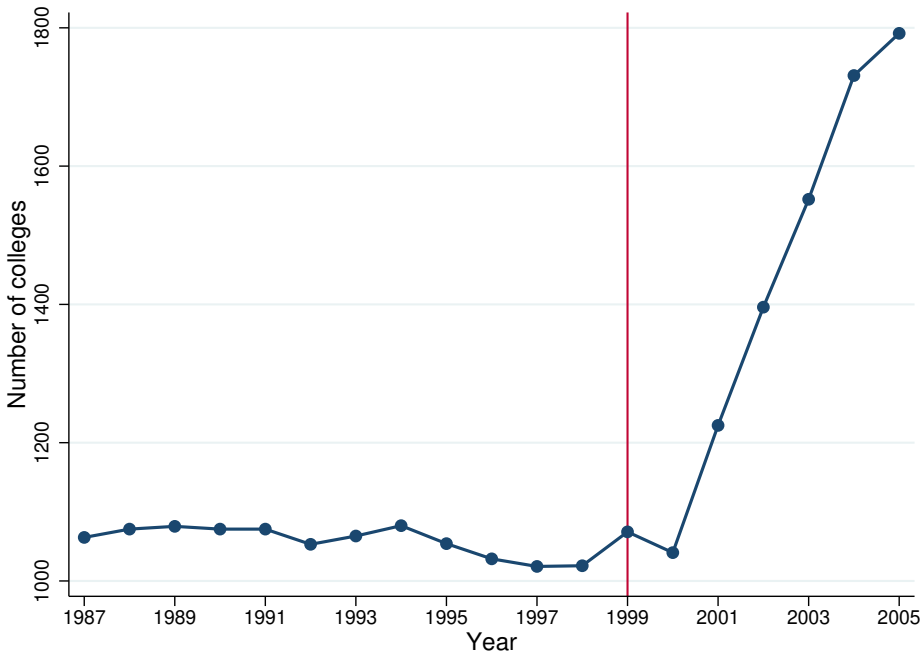


Figure 2: Number of Colleges

Notes: This figure plots number of regular higher institutions in China. Data is compiled from China Yearly Statistical Book.

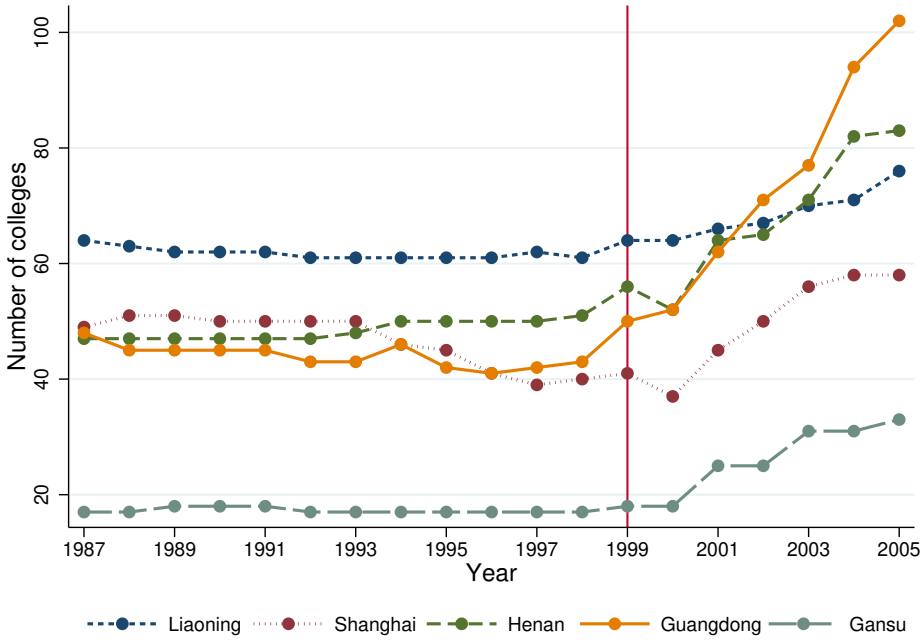


Figure 3: Variation in Number of Colleges

Notes: This figure presents number of colleges for selected provinces over time. Source: China Yearly Statistical Book.

Figure 4: Number of Colleges and Hukou Reform

Notes: This figure shows scatter plot of number of colleges and hukou reform for province-year pairs between 1987 and 2004. Each dot represent a pair of number of colleges and hukou reform index. Reform index is the mean of city reform index in a province, which is compiled by Fan (forthcoming). I first run separate regressions of the two variables on a set of province and year fixed effects and obtain the residuals. Then I plot the residuals of the two variables against each other. The fitted line has a slope of -0.034 with standard error 0.41. The p-value is 0.934 and R^2 is 0.

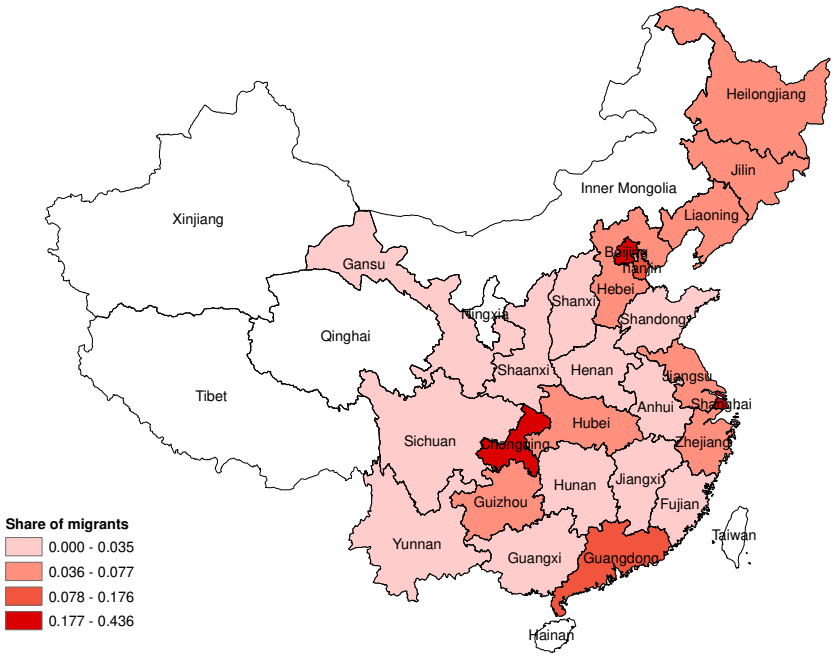


Figure 5: The Geography of Cross-Province Migration

Notes: This figure shows the map of cross-province migration in China based on author's calculation of CFPS sample data. Sample consists people of age 25 to 40. The share is calculated as number of people who are residing in the province that is different from age 12 province, which is the same as the share of in-migrants for each province.

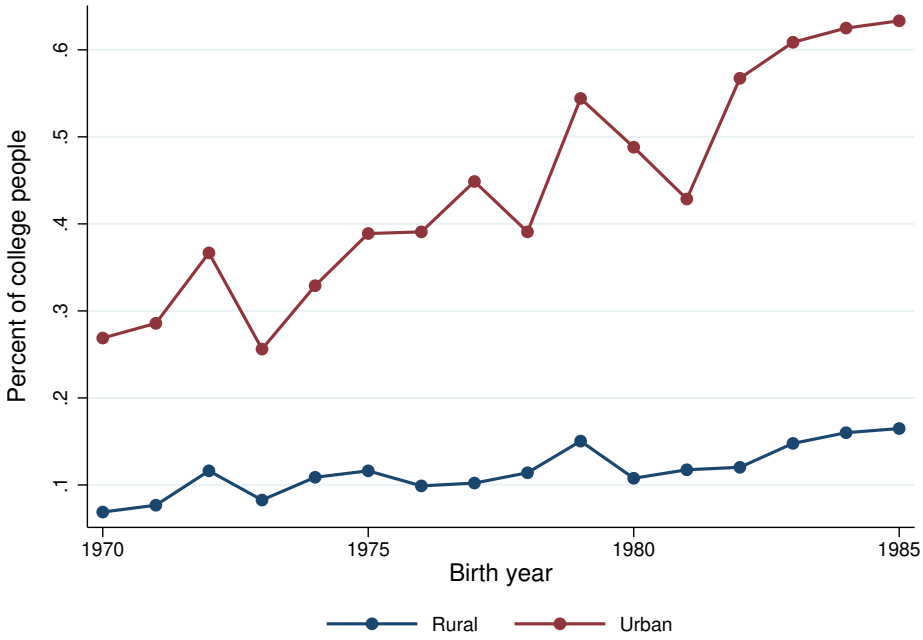


Figure 6: Share of College People by Rural/Urban hukou at Age 12

Notes: This figure shows the share of rural and urban college people in 2010 by their urban hukou status at age 12.

Appendix
College Education and Internal Migration in China

Xiaozhou Ding

September 2019

A Data

A.1 CFPS Data

China Family Panel Studies was conducted in 25 provinces of China except for Hong Kong, Macao, Taiwan, Xinjiang, Tibet, Inner Mongolia, Ningxia, and Hainan. These 25 provinces consists of 95% total population of China, which can be viewed as a representative sample of China (Xie and Hu, 2014). Figure A1 shows the coverage of CFPS data, which covers northeast, east, central, and west region of China. Since CFPS oversamples five "large" provinces, Shanghai, Liaoning, Henan, Gansu, and Guangdong, and these five provinces have regional representativeness, we can use CFPS to make statistical inferences between provinces and regions (Xie and Lu, 2015). Base year 2010 survey is used in this study.

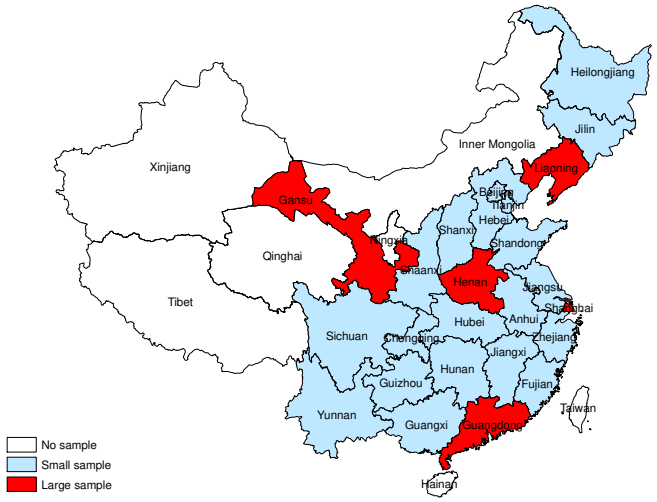


Figure A1: Coverage of CFPS

Notes: This figure shows the coverage of CFPS. Source: China Family Panel Studies Manual.

Measures of Migration Migration is usually defined as moving from a place to another within a period of time. It consists of both geographical definition and time restriction. Different data and measure will offer different perspectives on mobility of a society and hence is very difficult to conduct cross-country comparison (Molloy et al., 2011). Since there exists hukou system in China, it has been a long time that people have focused on hukou migration, defined as current location is different from hukou location, which is hard for scholars to compare mobility in China with other countries. In this paper, I mainly focus on general migration definition utilizing CFPS questions on residence provinces. CFPS has advantages in measuring migration because it has detailed information on residence location at birth, age 3, age 12, and current in addition to hukou status. Since hukou restriction on work has been gradually relaxed over time, residence location depends less and less on hukou and hence the migration measure based on general location is more comparable to the U.S., Europe, and other places in the world. Also because traditional hukou measure of migration is likely to underestimate the mobility, I choose general migration including all individuals for analysis.

I examine how college affects internal migration in China, which requires information on location before and after college on hands. Comparing to Malamud and Wozniak (2012) where they used birth state and current state to measure "lifetime" migration, I use province at age 12, which is the closest time prior to college I have, to define migrants. Table A1 also provides alternative measures of migration.

Table A1: Measures of Internal Migration in China

Origin	Destination	Migrants	Non-migrants	Migration Rate
Lifetime Measures				
Age 12 province	Current province	561	5,337	9.51%
Birth province	Current province	622	5,276	10.55%
Birth hukou province	Current hukou province	318	5,497	5.47%
Age 3 Rural	Current urban	1,124	4,759	19.11%
Contemporaneous				
Current hukou province	Current province	345	5,551	5.85%
Current hukou city	Current city	750	5,100	12.82%
Current hukou rural	Current urban	1,388	4,305	24.38%

Note: This table shows different measures of internal migration based on origin and destination location and time period. Author's calculation based on 2010 CFPS data. Sample consists adults age between 25 and 40.

College Education CFPS asks detailed information on education level, duration, and completion (drop-out) year, and also provides adjusted best education level based on self-reported value from respondents and converts corresponding education level to years of schooling. I calculate the start year of college for those people who report college education. I assume college year is the same year when high school is completed for high school degree holders. For those people who do not finish high school, I assign age 18 to them. Table A2 shows the distribution of average age

in both college year and survey year. In general it fits the reality that most people go to college at age 18 since there is no systematic deviation of age distribution throughout the sample.

Table A2: Mean Age by College Year

College year	Mean age	Current age	Obsevations
1987	15.50	38.50	16
1988	17.90	39.90	375
1989	18.01	39.03	419
1990	18.13	38.13	348
1991	18.22	37.24	408
1992	18.34	36.40	356
1993	18.43	35.45	335
1994	18.49	34.50	336
1995	18.45	33.46	308
1996	18.52	32.53	352
1997	18.72	31.74	362
1998	18.61	30.65	364
1999	18.61	29.63	374
2000	18.81	28.84	381
2001	18.71	27.78	357
2002	19.07	27.09	352
2003	19.28	26.30	355
2004	21.13	27.14	100
Total	18.55	33.03	5,898

Note: This table shows age distribution in terms of college year.

Figure A2 shows percent of college people by each college cohort. As can be seen from the figure, the expansion of higher education in China lifted the share of college people for cohorts born after 1981, around the same time the first cohort who were affected by the expansion in 1999. I also examine other two data sets, which are also commonly used in China. China Household Finance Survey 2011 and China General Social Survey 2010. Both data sets demonstrate similar pattern of college people share throughout time. However, CFPS have smaller magnitudes comparing to the CHFS and CGSS, which could only lead to underestimate of college impact on internal migration if more educated people are more likely to move.

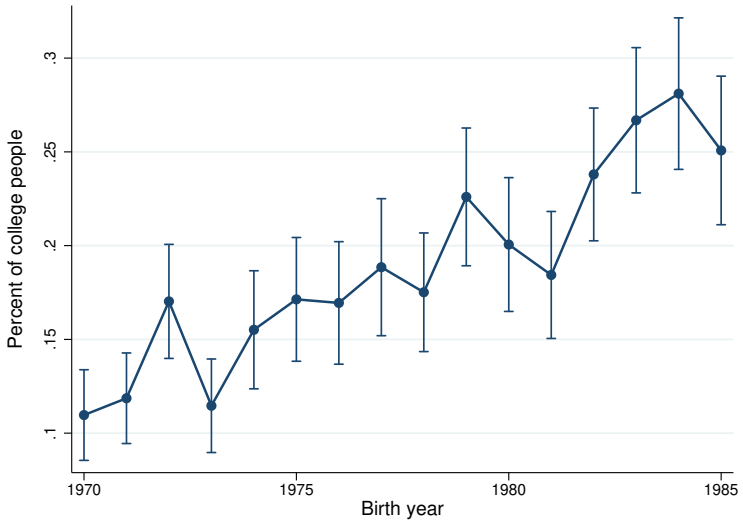
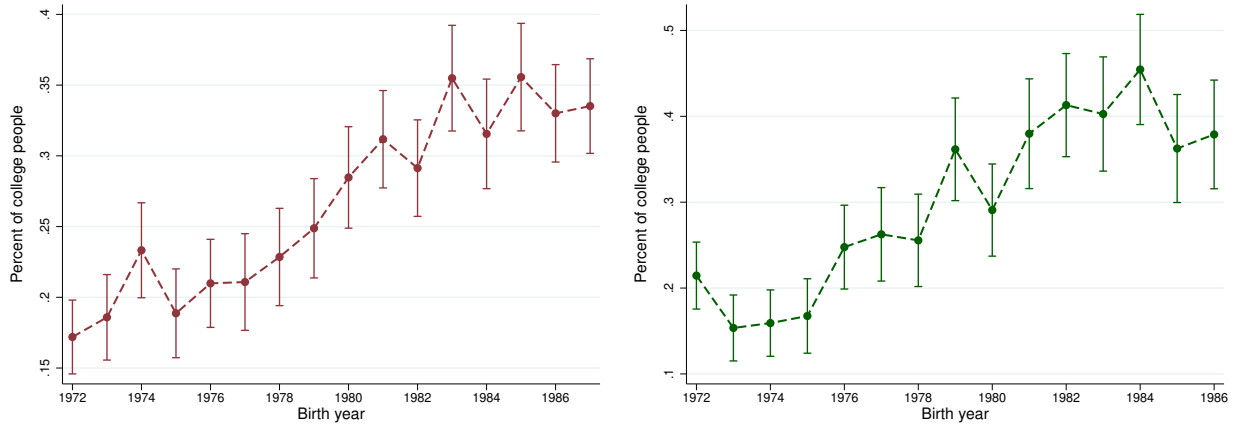


Figure A2: Share of College People

Notes: This figure shows percent of people with college at each college year cohort level. Source: author's calculations based on CFPS data.



(a) CHFS (b) CGSS

Figure A3: Share of College People from CHFS and CGSS

Notes: This figure presents share of college people by birth year from two additional data sources, China Household Finance Survey 2011 and China General Social Survey 2010.

Sample Selection I drop cohorts who were born after 1985, because they are supposed to take the college entrance exam after 2004, and will not be expected to graduate until 2009, when the survey was conducted. I further restrict the age of respondent when taking the survey to be between 25 and 40 in their mid-ages so it is more comparable with the literature. Lastly, I include full-sample of both urban and rural residents. Therefore the data set consists urban natives, rural natives, rural-urban migrants, urban-urban migrants, and urban-rural migrants. Figure A4 plots

density of age distribution for migrant and non-migrants in year 2010. Non-migrants tend to be older comparing with migrants, which demand for control for age in regression analysis.

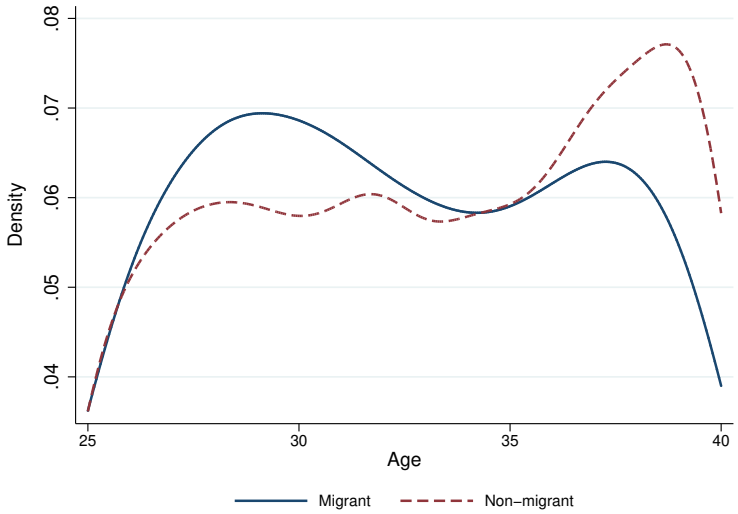


Figure A4: Age Density of Migrants and Non-migrants

Notes: This figure plots the density of age for migrants and non-migrants.

A.2 Higher Education Expansion

Figure A5 shows annual new enrollment in regular higher institutions and enrollment rate. Admission was suspended between 1966 and 1970 due to the Cultural Revolution and gradually relaxed from 1970 to 1978. In 1978, NCEE was resumed and higher education in China was back to its normal stage. There is a rapid increase in enrollment rate entering 1980s and then it became relative steady later. Beginning in the 1990s it was growing again, and the Chinese government implemented the higher education reform in 1999, which expanded its higher education size and enrolled more than 1.5 million college students in that single year, which is more than 40 percent of previous year enrollment. The national average admission rate has been steadily growing over time, reaching nearly 80 percent in 2015.

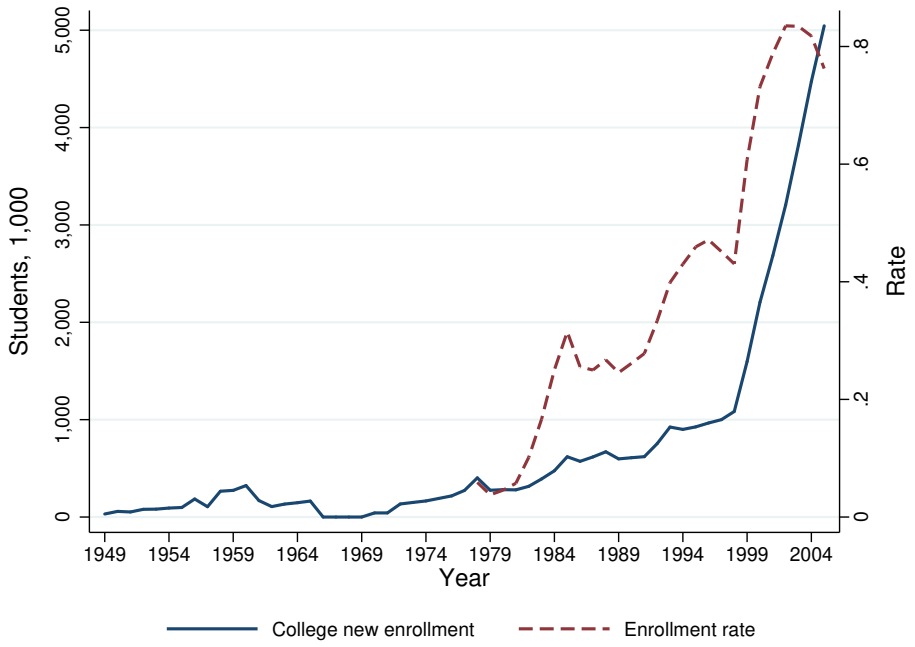


Figure A5: Number of College New Enrollment and Enrollment Rate

Notes: This figure plots number of new students enrolled in Chinese colleges every year since 1949 and enrollment rate since the reinstallation of college entrance exam since 1978. Data is compiled from China Yearly Statistical Book.

College Data College data is obtained from National Bureau of Statistics. Number of colleges is available since 1987. I merge college data with CFPS adult survey based on inferred college year.

Figure A6 shows the relationship between per college enrollment in 1987 and 2005 where the size of each circle is measured by number of elite universities in each province. The college expansion does not have same pattern for every province but highly depends on existing size.

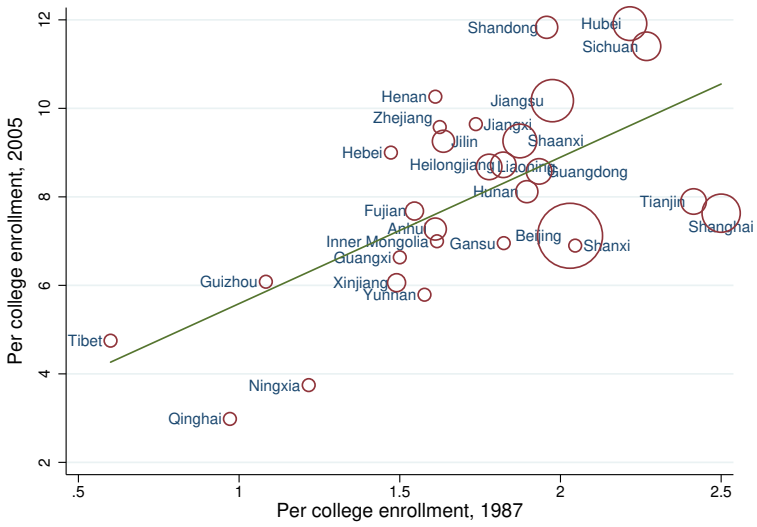


Figure A6: Change of Per College Enrollment from 1987 to 2005 (thousand)

Notes: This figure plots number of per college enrollment in each province between 1987 and 2005. The size of each circle reflects the number of elite universities (listed in "211" and "985" projects) in that province. Data is compiled from China Yearly Statistical Book.

A.3 Hukou Reform Data

In order to examine the potential threat that if hukou reform is positively correlated with higher education expansion and provinces with more colleges are more relaxed in hukou policies , I use hukou reform index compiled by Fan (forthcoming). This data set is city level so that I calculate an average index of province each year from 1997 to 2004. For years before 1997, I assign zero to all provinces. Then I run the following regressions for number of colleges and provincial index separately and obtain the residuals.

$$y_{jt} = \alpha + \sum_{j \neq 1} \gamma_j + \sum_{t \neq 1987} \lambda_t + \epsilon_{it} \tag{A.1}$$

Finally, I plot the two residuals. There is no strong evidence indicating hukou reform is positively selecting rapid expansion provinces.

B Additional Tables

Table B1: Share of 5-Year Interprovincial Migrants

	Census 1990	Census 2000
Conditional on migration		
Less than primary	16.2%	8.1%
Primary completed	58.1%	71.8%
Secondary completed	22.2%	18.1%
University completed	3.5%	2.0%
Conditional on education		
Less than primary	1.1%	4.6%
Primary completed	1.9%	6.6%
Secondary completed	3.6%	7.0%
University completed	10.7%	9.7%

Notes: Data from IPUMS and calculated by author. Sample is all individuals age between 16 and 64. Migrant is people who reside in a province different from 5 years age.

Table B2: Share of Lifetime Interprovincial Migrants

	Census 2000	CFPS 2010
Conditional on migration		
Less than primary	9.3%	38.0%
Primary completed	66.2%	32.5%
Secondary completed	21.1%	16.7%
University completed	3.4%	12.8%
Conditional on education		
Less than primary	8.4%	6.3%
Primary completed	9.7%	7.7%
Secondary completed	13.0%	8.2%
University completed	26.6%	13.0%

Notes: Data from IPUMS and CFPS 2010 and calculated by author. Sample is all individuals age between 16 and 64. Migrant is people who reside in a province different from birth province in survey year.

Table B3: Impact of College on Migration for High School and Above

	(1) Men	(2) Women
College	0.105	0.162
	(0.072)	(0.100)
Male	-0.033***	-0.028***
	(0.008)	(0.007)
No. siblings	0.003	0.003
	(0.007)	(0.012)
Married	0.017	0.091**
	(0.022)	(0.043)
Mother years of schooling	0.001	-0.004
	(0.002)	(0.004)
Father years of schooling	-0.001	0.008*
	(0.003)	(0.004)
Urban hukou at age 12	-0.048*	-0.024
	(0.027)	(0.027)
Urban	0.085***	0.112***
	(0.025)	(0.033)
GDP growth rate	0.213	0.243
	(0.298)	(0.370)
Urban employment to population ratio	-0.102	-0.362
	(0.380)	(0.480)
Wage growth rate	-0.543	-0.570
	(0.378)	(0.416)
Observation	971	876
F statistic	26.673	34.099

Notes: This table show 2SLS results for men and women above high school degree separately. Age 12 region by cohort fixed effect and age 12 province fixed effect are included but not reported. Robust standard errors are clustered at province by cohort level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table B4: Overidentification Tests Using Parental Education and Number of Colleges as IV

	(1) IV
College	0.119**
	(0.050)
Male	-0.028***
	(0.007)
No. siblings	0.009***
	(0.003)
Married	0.035**
	(0.014)
Urban hukou at age 12	-0.026
	(0.017)
Urban	0.047***
	(0.010)
GDP growth rate	-0.218
	(0.156)
Urban employment to population ratio	-0.219
	(0.216)
Wage growth rate	0.159
	(0.172)
Observation	5,262
F statistic	73.839
Overidentification test *p*	0.2276

Notes: This table show 2SLS results when number of colleges, parental years of schooling are used as instruments. Age 12 region by cohort fixed effect and age 12 province fixed effect are included but not reported. Robust standard errors are clustered at province by cohort level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

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