The Impact of Aggregate College Admissions on the Internal Migration in China: Evidence from the College Expansion

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Abstract

China undertook a nationwide college expansion in 1999-2012, which dramatically increased college admissions and higher educational resources across the country. This paper studies the impact of aggregate college admissions on inter-provincial migration in China for different age groups before and during the college expansion. Using both a linear model to examine migration propensity, we find that the college expansion has a direct "enrollment effect" and a "competition effect" on inter-provincial migration. College-bound students are more likely to migrate in ages 17-20 as college admissions in outside provinces increase; and college graduates are more likely to migrate after graduation as the number of local new college graduates increases. In addition, we identify a negative impact of local college admissions on migration in ages 17-20, reflecting the improvement in local educational and labor market opportunities. We also use a conditional Logit model to consider migration choice, it indicates a positive of regional college admissions on inter-regional migration.

1. Introduction

The college expansion in China (1999) has provided increasing opportunities for people to attend college and greatly upgraded China's labor. Accompanied with the increasing migration due to China joining the WTO in the same cohort, this policy also affects the migration pattern in China. More college enrollment opportunities in both local province and provinces outside the local province change the migration behavior for people who plan to attend college. After graduating from colleges, increasing competition from more new college graduates entering the local job market affect their decisions of migration again. The college expansion also changes the migration behavior for non-college graduates.

This paper studies the impact of the college expansion on inter-provincial migration in China. It extends the previous migration literature on college-bound students (Tuckman, 1970; Fenske, 1972; Steahr and Lowe, 1975; Mixon and Hsing, 1994a; Mak and Moncur, 2003; Crook and Boyle, 2011; Faggian and Franklin, 2014; Liu et al., 2017) by studying the effect of college enrollment opportunities on migration for both college-bound students and who did not attend college. Also, we extend the literature on the migration of college graduates (Yousefi and Rives, 1987; Kodrzycki, 2001; Tornatzky et al., 2001; Gottlieb and Joseph, 2006; Ishitani, 2010) by studying the competition effect from college expansion, as well as the effect of increasing skilled labor supply on non-college graduates. Different from previous literature on the causal effect between education and migration (Malamud and Wozniak, 2012; Machin et al., 2012; McHenry, 2013), this paper argues that there is also direct impact of educational policies on migration decision. Papers which use college expansion as an instrument for education may be biased since the college expansion also has direct effect on migration. The paper is structured as follow: Section 2 introduces the related migration literature; Section 3 describes the basic statistics of migration pattern, and the college expansion in China; Section 4 illustrates the model we use in this paper; Section 5 shows the regression results and analyses; Section 6 shows the results or robustness check; and Section 7 concludes the paper.

2. Literature Review

Many economic studies address the same question on migration: Why do people migrate? Specifically, what is the process by which people make a migration decision? Is it just random or does it follow certain rational processes?

Roy (1951) proposed a model which suggested that migration decisions are not random but imply self-selection. He emphasized the selectivity of migration, suggesting that people with higher-than-average earnings in both their home country and in another country are more likely to immigrate when the earnings distribution in the home country is more dispersed. Sjaastad (1962) proposed a decision-making model based on cost-benefit analysis, under the assumption that migration is a kind of human capital investment. The paper suggested that migration can be viewed as an equilibrating mechanism in an economy, which promotes efficient resource allocation and facilitates individual human capital production. Wolpert (1965) assumed that people make migration decision by comparing utility at different locations, subject to imperfect information. Therefore, people's migration decision may not be optimal. Harris and Todaro (1970) relaxed the human capital assumption by introducing imperfect labor markets in studying the migration from rural to urban areas. In their model, differences in the expected unemployment rate and income between rural and urban areas drive people to migrate. Later studies further developed the literature by proposing that migration decisions may be made by family, and stressing the importance of social network and personal characteristics on migration decision making.

Mincer (1978), Stark and Bloom (1985), Cobb-Clark (1990), and Borjas and Bronars (1991) argued that migration decisions are made by families or among groups, rather than by individuals. Instead of maximizing personal utility, people make migration decisions to maximize their family or group income. Carrington et al. (1996), and Bauer and Zimmermann (1995, 1997) introduced dynamic network models, which stressed the importance of networks within certain groups that help reduce migration costs.

Gravity variables such as distance between host and destination locations, and the population of host and destination locations are important factors in the migration decision (Greenwood,1985,

1997; Van der Gaag and Wissen, 2003; Adrienko and Guriev, 2004; Cushing and Poot, 2004). Longer distance deters migration, but how population affects migration is empirically not clear (Hanson and Spilimbergo, 1996; Anjomani, 2002). Besides unemployment rate and average income (Daveri and Faini, 1999; Young, 2013; Ederveen and Bardsley, 2003), other aggregate factors, including economic variables, such as GDP and living cost (Abbott & Schmid, 1975; Kyung, 1992; Greenwood,1997; Parikh and Van Leuvensteijn, 2003) and environmental variables, such as social amenities (Black et al., 2000; Chen and Rosenthal, 2008) and natural environment (Graves, 1979; Mueser and Graves, 1995; Adrienko and Guriev, 2004) also affect the migration decision.

Schwartz (1976) examined differences in migration behaviors for various age and education groups in terms of their responsiveness to available individual opportunities. As educational level increases, people are more likely to migrate; but the probability of migration decreases with age for more highly educated people. Other studies also stress the importance of individual characteristics in the migration decision (Greenwood, 1975, 1985, 1997; Cadwallader, 1992; Plane and Bitter, 1997; Cushing and Poot, 2004). People are less likely to migrate when they are older (Sjaastad, 1962; Schultz, 1961; Champion and Fotheringam, 1998). Some studies suggested that men are more likely to migrate than women, especially when migration is for employment (Faggian, McCann and Sheppard, 2007), whereas women are more likely to migrate than men for family-related reasons (Boyle and Halfacree, 1995). Important life events, such as employment, unemployment, marriage, retirement also play important roles in the migration decision (Rogers et al., 1978; Da Vanzo, 1978; Graves and Linneman, 1979; Plane and Heins, 2003).

A frequently mentioned personal characteristic in the migration literature is education. Empirical studies suggest that level of education is positively associated with probability of migration (Schlottmann and Herzog,1981; Nakosteen and Zimmer, 1980, 1982; Da Vanzo, 1983). According to the summary in Haapanen and Böckerman (2013), there are several reasons for the association between education and migration. The first one, echoing Schwartz (1976) as noted above, is related to earnings differentials across areas. Skilled workers have higher expected return from migration and more transferable human capital, and thus are more likely to migrate to areas providing greater

average earnings (Levy and Wadycki, 1974; Wozniak, 2010). In addition, job opportunities for skilled workers are usually greater and more dispersed across areas (Schwartz, 1973), which drive skilled workers to migrate. Also, people with more education may be better in obtaining information on the origin and destination (Greenwood, 1997). Finally, the psychic costs for skilled workers to leave a hometown may be smaller than those for unskilled workers (Schwartz, 1973; Newbold, 1998).

However, a problem associated with identifying the causal relationship between education and migration is that they may both be affected by unobserved variables, which can result in biased estimates of the causal impact. One approach to solve this problem is using experimental or quasi-experimental methods. Malamud and Wozniak (2012) used the draft-avoidance behavior in the Vietnam War period as an instrument for education and found a positive causal impact of education on the probability that people live outside of their birth states. Machin et al. (2012) used the reform of school instituted in 1959 in Norway as an instrument and found that education increased the probability of migration. In contrast, McHenry (2013) employed changes in the age of compulsory schooling in the U.S as an instrument for those with relatively little education and reported a negative causal impact of education on internal migration.

Some research focuses on the migration decision and the migration patterns of college-bound students and college graduates. For the study of migration of college-bound student, Tuckman (1970) found that the average price charged by colleges, the number of public colleges, the amount of college aids, as well as the average income, within the home state jointly explain about 64% of the variation in the proportion of students leaving their home state to attend college. Fenske (1972) found that interstate migration declined but intrastate migration increased for freshmen in the U.S in 1966-1969, and he attributed the observed patterns to two national developments in higher education: erection of barriers by many states to discourage out-of-state students at state institutions, and the rapid increases in the number of public junior or community colleges, with increasing enrollments. Other empirical studies suggest that states with more educational choices and higher quality educational services, lower tuition, merit scholarship programs, higher grants and more generous fellowships, and lower average income are more likely to retain college-bound

freshmen (Steahr and Lowe, 1975; Mak and Moncur, 2003; Crook and Boyle, 2011). College-bound students consider the size of an institution, class size, difficulty of college entrance, quality of college research, and athletic programs when they make their decision of whether to migrate outside the state to attend college (Mixon and Hsing, 1994a). Also, students with better academic performance are more concerned with the characteristics of the institution and less with the location (Faggian and Franklin, 2014).

Looking migration decisions for college graduates, Yousefi and Rives (1987) suggested that those who are younger, male, who graduated from a high school outside of the state, and those with an engineering major are more likely to migrate. Those who majored in agriculture, veterinary medicine, or education, or those who are looking for a job at graduation are less likely to migrate. Kodrzycki (2001) and Tornatzky et al. (2001) both found that if a person graduated from a high school located in the same state of his/her college, the person was less likely to migrate to another state after graduating from college. Economic conditions in the state of graduation and outside states were also important in determining the migration behaviors for college graduates (Kodrzycki, 2001; Ishitani, 2010). Gottlieb and Joseph (2006) found that graduates with science degrees were more likely to migrate to states with more educated populations. PhD graduates were more concerned with amenities than were others.

Although there are many studies on the internal migration in China, there is not much research on the migration of college-bound students and college graduates in the Chinese context. Liu et al. (2017) found that the migration of university entrants is mainly determined by the differences in university enrollment, while labor market differences, the distribution of universities, and cost of living are less important. For the migration of college graduates, Yue (2005) found that the initial earnings for college graduates employed in an outside province are greater than the initial earnings they would receive if they stayed in the same province. Also, having a rural or a non-local Hukou seems to deter high quality graduates from taking high-earning occupations. Li, Liu & Guo (2009) suggested that college graduates who migrated for employment are more likely go to big metropolitan cities in the eastern provinces than to migrate to central or western provinces. Yue (2010) found that most college graduates stay in the provinces where they graduated from. College

graduates who are men, or graduated from better quality of high school, or those grew up in rural areas are more likely to migrate. Also, GDP per capita in the destination places has a positive effect on migration. Liu and Shen (2014) showed that China's skilled people tend to migrate from economically less developed inland areas to more developed coastal areas, with the migration patterns for skilled and less-skilled people being similar. They attributed the similarity in migration patterns between the skilled and unskilled to both well-established labor-intensive industries and fast-growing knowledge-based industries in the coastal provinces. Employment opportunities and wage differentials play a dominant role in attracting skilled labor, whereas the impact of amenities is less clear. Liu et al. (2017) confirmed that skilled workers have a strong tendency to stay in the same province where they obtained their higher educational levels. The migration of college graduates is mainly driven by regional differences in wages but not the differences in unemployment rates. Fu and Gabriel (2012) suggested that concentration of educated populations in a region has a significantly positive impact on the migration odds for people at the highest educational levels.

There is a gap in the previous literature on the migration in China as very few studies have discussed the impact of educational policies on migration decision. In this paper, we analyze the impact of the college expansion on migration behaviors for college-bound students, college graduates, and non-college graduates. This study contributes to the literature by studying the direct effect of the college expansion on the migration decision of those during the ages of college attendance, and in the period after graduation for both college graduates and others, and we also analyze the economic channels for the observed impacts.

3. Descriptive statistics

We use the 2012 Chinese Labor Dynamic Survey (CLDS) survey to conduct our study on migration. The CLDS is the first national longitudinal study of Chinese labor force, launched by the Sun Yat-Sen University. It is a nationally representative biannual rotation panel survey started in 2012 and covers 29 provinces in mainland China (excluding Tibet and Hainan). The sampling method of this survey uses probability-proportional-to-size sampling (PPS) of household, and the targeted respondents of the survey are individuals aged 15-65 at the survey. The survey is suitable

for studying migration behavior in different ages since it asks people details of their first five migrations, including when they migrated, where they migrated from and migrated to, and why they migrated. It also obtains basic demographic information, including education, Hukou[1] status, Hukou change history, work history, and parents' information. By summarizing the micro-level statistics from the survey data and comparing them with the macro-level statistics of migration, we can have an overall understanding of migration patterns in China.

(1) Migration Pattern in China in Recent Decades

The volume of migration has surged greatly over the period of Reform and Opening beginning in the 1980s due to the development of the economy and relaxation of migration restrictions. The Chinese government defines migration in a different way from that of most migration studies. The official measure of migration is related to people's registered address (Hukou). One measure of migration counts a person as a migrant if the person lives in a different address than his/her Hukou address for at least 6 months. A more frequently measure of migration is based on what is called the "floating population", which includes people who live in different addresses than their Hukou addresses for at least 6 months, but it does not count any within-county address discrepancy. Figure 1 shows the volume of the floating population in China from 1982 to 2015, as well as the percentage of this group in the whole population, and the regional distribution among the migration destination. We can see that the number of migrants surges nearly 40 times from 1982 to 2015, and the migrant population fraction increases from 0.7% to 18.2%. As for the destination of migration, eastern provinces always attract migrants most, accounting for 40%-60% of all migration destinations. Western provinces attract about 20%-30% migration destination, and central provinces attract about 15%-25% migration destinations.

In Figure 2, we show the educational distribution of the floating population in China using the results from two recent Chinese censuses. As can be seen from the figure, the largest educational categories of migrants in China contain those who have middle high school diplomas (9 years of education) or senior high school diplomas (12 years of education). Migrants in 2010 are more

[1] Hukous identify an individual's official residence and related information..

educated than migrants in 2000, since the proportion of college graduates and above increased by 4.8 percentage points. This may be related to the college expansion in China since 1999, which greatly increases the number of college graduates.

In Figure 3, we plot the inter-province and intra-province migration rates and their 95% confidence intervals for ages 17-20, 21-25, and 26-34 for non-college graduates and college graduates who migrated in 1984-1991, 1992-1998, and 1999-2012. The migration rate is calculated using the number of observations where the respondent stated they had changed their place of residence either to a different province (inter-provincial), or within a province (intra-provincial) in an age range (e.g., migrated in age 17-20) during a time period (e.g., migrated in 1999-2012), divide by the number of observations for which the age range occurs within a specified time period (e.g., observations who were at least 17 in 1999 and who were at most 20 in 2012).

As can be seen from the graph, the inter-provincial migration rates for both college graduates and non-college graduates increase over time. For non-college graduates, the rate in every age group more than doubles from 1984 to 2012. The inter-provincial migration rate for non-college graduates increases relative to that for college graduates in ages 17-20 across time, and it is 4 percentage points greater than the migration rate for college graduates in 1999-2012. The increasing gap in inter-province migration between college graduates and non-college graduates in younger ages may be explained by the relaxing of Hukou restrictions in the late 1980s and China's entry into the WTO, which provided opportunities for non-college graduates to work in coastal provinces. The inter-provincial migration rate increases for college graduates in each age group, although the growth rate is smaller for them. The increase in the migration rate for college graduates in ages 21-25 triples in 1999-2012 compared to 1992-1998. Besides the explanation mentioned for the increase of migration rates for non-college graduates, another possible reason is due to the college expansion starting in 1999, which greatly increases the skilled labor supply and thus change their migration behavior.

The intra-provincial migration rates also increase greatly from 1984 to 2012 for both college graduates and non-college graduates. The intra-provincial migration rates are higher for college graduates than non-college graduates for ages 17-20 in all time periods. But due to relatively small sample sizes of college graduates in early periods, the migration rates are estimated with great uncertainty for ages 21-25 and ages 26-34 in 1984-1991, and for ages 26-34 in 1992-1998.

Figure 4 shows the distribution of migration reasons provided by the CLDS respondents. We can see that in the age range 17-20, in all periods more than 60% of the college-graduate migrants migrated to obtain education, but migration for work accounted for at least 75% migrants who didn't have college degrees. Considering the migration of college graduates when they were 17-20 years old, in 1992-1998 they were less likely to migrate for education than in 1999-2012; and compared to those in 1984-1991, they are less likely to migrate to join the army. The proportions of migration for work in ages 21-25 is similar for non-college graduates and college graduates in 1984-1991 and 1999-2012, but higher for noncollege graduates in 1992-1998. That some people choose to take part-time college courses after they start working is a possible explanation for the increase of "education" portion in 1992-1998. After 1999, since college admissions expanded greatly, it is much more likely for a person to attend college in the age range 17-20, rather than later, when they already have a job. Due to small sample sizes for college graduates in early periods, we are not able to plot migration rates for them for ages 26-34 in 1984-1998. But based on what we observe in 1999-2012, although non-college graduates in the age range 26-34 are likely to migrate for work, this reason accounts as a very small portion for college-graduate-migrants for ages 26-34. They are more likely to migrate for family or other reasons in this age range.

As noted in the previous paragraphs, the household registration system, Hukou, plays a very important part in people's lives, especially in migration decision making. Local governments determine the public services a person can receive based on whether the person has a local Hukou, and whether the Hukou type is agricultural or non-agricultural. For those born elsewhere, it is not easy to obtain Hukou registration in a large city, like Beijing or Shanghai. Also, there are some restrictions if a person wants to change his/her Hukou type. Figure 5 plots the migration rates and the Hukou change rates for ages 17-20, 21-25, and 26-34 for non-college graduates and college

graduates in 1984-1991, 1992-1998, and 1999-2012. The patterns for migration rates are similar to what we observe in Table 3 in that they all increase dramatically for both college graduates and non-college graduates from 1984 to 2012, and the gaps of migration rates between non-college graduates and college graduates become greater over time. Hukou change rates are higher for college graduates than for non-college graduates in all age groups and in all periods since the requirements of changing Hukou to a more economically developed region are highly related to education. Traditional ways to change a Hukou status from rural to urban or change a Hukou to a large city is through enrolling into a college, joining the army, and marriage. For example, students enrolled in a college located in a large city can change Hukou to that city and receive public services there. Upon graduation, if they obtain employment in the city, they can retain that Hukou designation.

However, Hukou change rates do not increase much from 1984 to 2012 for young people. For older people (ages 26-34), the Hukou change rate increases greatly across time, suggesting that the Hukou relaxation likely benefited older people most. Although non-college graduates in the age range 17-20 are more likely to migrate, they are much less likely to change their Hukou (registered household addresses and type) than college graduates. This suggests that non-college graduates are more likely migrate without changing their Hukou, which is because the requirements for changing a Hukou are more challenging for them. In fact, those admitted to college often are permitted to obtain a new Hukou designation, and those who obtain government or higher level positions are generally able to obtain such a change (provide citation here). Those who are not able to modify their Hukou are less like to migrate permanently since Hukou is highly associated with the public services a person can access in the registered location.

More evidence on the relationship between migration and Hukou change can be seen in Figure 6, which plots the tabulation of migration decision and Hukou change for different age groups in 1984-1991, 1992-1998, and 1999-2012. This figure suggests that college graduates are more likely to change Hukou without migration than non-college graduates for all age ranges in all periods. Changing Hukou but without migration is possible since a person may migrate at an early age without changing Hukou and satisfy the requirements to change Hukou later. For example, a

person may migrate before 17 with his/her parents and enroll to a local college after age 17. Our data supports this explanation. We also observe that non-college graduates are more likely to migrate without changing Hukou than college graduates, especially for those who were in the age range 17-20 in 1999-2012. This pattern also supports the view that non-college migrants are more likely to be temporary migrants rather than permanent migrants.

Figure 7 shows the distribution of region types after people changing their Hukou by age range and by education in 1984-1991, 1992-1998, and 1999-2012. There are 33 provinces (including 4 Municipalities), 333 prefectural regions, 2862 county level regions, 41636 township level regions in China. Due to small sample sizes in early periods, we only plot Hukou change reasons in ages 17-20 and ages 21-25. We can see from this graph that there is a huge difference between the college-graduate migrants and non-college-graduate in terms of region types they change their Hukou. In all periods and all age ranges, non-college migrants are much more likely to change their Hukou to township level or below addresses, while college migrants are more likely to change their Hukou to prefectural cities, provincial capitals, or municipality. We also see that both non-college graduates and college graduates are more likely to change their Hukou to provincial capitals for ages 17-20 in 1999-2012 than before, which is another evidence of that young non-college graduates were attracted by the rapid economic growth in coastal cities and chose to work there.

Figure 8 plots the reason of changing Hukou by age group and by education in 1984-1991, 1992-1998, and 1999-2012. Observed from the figure, we can conclude that the top 1 reason for non-college graduates to change their Hukou is family-related reason in all age groups and in all time periods. College graduates who changed their Hukou in 17-20 are most likely due to receiving education, and the proportion is even greater than previous periods, which reaches to 95% of the Hukou change reasons in 1999-2012. This is most likely due to the college expansion started from 1999. Also, college graduates are more likely to change Hukou for work than non-college graduates in ages 21-25, although they are similar or less likely to migrate for work-related reasons (see Figure 4) than non-college graduates for ages 21-25. These patterns also suggest that in China, less-educated migrants are more likely to be temporary migrant, who migrate for work but do not

ask for the access to receiving basic local welfare (Hukou). On the contrary, more-educated migrants are more likely to be permanent ones.

(2) College Expansion in 1999

In 1999, the Chinese government announced a decision to accelerate the expansion of higher education in order to increase human capital accumulation, stimulate domestic demand, and improve employment options for young people and workers laid off from State Owned Enterprises. In the Fifteenth National People's Congress, the Ministry of Education of the PRC published guidance for higher education development in China for the 21th century. It set a goal for the higher education enrollment rate to reach 11% by 2000 and more broadly to dramatically increase the number of college-educated people in the 21th century. The main policy associated with this guidance is increasing the college admissions in all provinces of mainland China.

Figure 9 shows the number of college admissions and their regional distribution in China from 1992 to 2012. From 1993 to 1998, the number of admissions stayed around 2 million. In 1999, the admissions increased by 48%, and it kept increasing more than 10% every year to 2012. The number of college admissions increased by nearly 4 times from 1998 to 2012. Also, the proportion of college admissions in the eastern provinces account 55% before 1999, but it gradually decreases to 48% by 2012. In contrast, the proportion of college admissions in central provinces increase by 3 percentage points and the admissions in western provinces increase by 4 percentage points. The change in regional distribution of college admissions suggests that the college expansion reform attempted to balance higher education resources across regions.

(3) Descriptive Statistics from Chinese Labor Dynamic Survey

Table 1 lists summary statistics for our sample from the Chinese Labor Dynamic Survey (2012) by birth cohort. The table shows us the pattern of migration for people born in different generations. Here, we use the most common measure of migration in the general literature. If a person lives in a different county /footnote on county size/ than where he/she lived 3 months earlier, then the person is counted as a migrant. The table first lists the mean and standard deviation of personal

characteristics including age, gender, and years of schooling. We also calculate the migration rate in each cohort using the number of observations that had migration history divided by the total number of observations in each birth cohort. In addition, we summarize the reasons for migration, age at first migration, regional distribution of first migration, and years of schooling for migrants. As we can see from the table, years of schooling, as well as the migration rate are increasing across birth cohort. People born in 1973-1982 are about 3 times more likely to migrate than people born in 1952-1962. Looking at the reasons for migration, the proportion listing political or family related reasons decreases across birth cohort, while people born in later cohorts are more likely to migrate for work or to pursue education. The average age at first migration decreases across birth cohorts, and younger generation migrants are more likely to migrate to eastern or western provinces but less likely to migrate to central or northeastern provinces. Also, as we expect, the average years of schooling is greater for younger migrants.

To better understand the pattern of different types of migration, in Table 2 we present the mean and standard deviation of age and education at the time of migration, gender, and Hukou status at birth by reason for migration (family, work, and education), as well as the destination region of migration. The table is also divided by migration cohort into the pre-college expansion period (1978-1998) and the post-college expansion period (1999-2012).

Table 2 shows that those who migrated in more recent cohorts were older and more educated at the time migration, more likely to be female, and more likely to have grown up in rural areas than the migrants who migrated before 1999. Those who indicate they migrated for education are in general younger, more educated, and more likely to have grown up in urban areas than those who migrated for other reasons. People who migrated for work are more likely have grown up in rural areas. For the regional distribution, we see that people who migrated for work are more likely to choose eastern provinces than those who migrated for other reasons, and the proportion of migration to the eastern provinces increase after 1999 for this group of migrants while it decreases for the other two groups. This may due to the huge economic growth and therefore increasing opportunity of employment in the eastern provinces since China's entry into the WTO. The

increasing proportion of migration for education to central provinces may be related to the college expansion policy beginning in 1999, since college growth was greatest in less developed regions.

4. Model

(1) OLS Model

We first start our analyses by applying a simple choice model. Assume that a person k's utility for living in a location i is U_i, which follows the form:

$$U_i^k = u_i + \varepsilon_i^k \tag{1}$$

where u_i is the utility of living in i, which is assumed to be the same for all individuals. ε_i^k is an error term that varies at both the individual and location level. Let M_{ij}^k denotes the decision for a person k to migrate from i to j, c_{ij} denotes the cost of migration from i to j, which is assumed to be the same for each person. Then, the person will choose to migrate only when: ${U_j}^k - {U_i}^k - c_{ij} \geq {U_l}^k - {U_i}^k - c_{il}$ for all l. Therefore, the probability for person k to migrate can be written as:

$$Pr(M_{ij}^k = 1) = Pr((u_j - u_i - c_{ij}) - (u_l - u_i - c_{il}) + \varepsilon_j^k \geq \varepsilon_l^k)\ for\ all\ l \tag{2}$$

Similar to Mcfadden (1974), we assume that ε_i^k follows an extreme value type I distribution for all i and k. Therefore, the probability of migration from i to j for person k is:

$$Pr(M_{ij}^k = 1) = \frac{e^{(u_j - u_i - c_{ij})}}{\sum_{all\ l} e^{(u_l - u_i - c_{il})}} \tag{3}$$

Also based on equation (2), the aggregate migration flow between i and j is:

$$M_{ij} = \sum_k \Pr(\mathrm{M_{ij}^k} = 1) = POP_i \frac{e^{(u_j - u_i - c_{ij})}}{\sum_{all\ l} e^{(u_l - u_i - c_{il})}} = POP_i {D_i}' D_j {d_{ij}}^{\gamma} \tag{4}$$

where D_i is a origin-specific vector, D_j is a destination-specific vector. We assume that the migration cost from i to j is mainly the transportation cost which depends on the distance between province i to province j, d_{ij}, and $c_{ij} = \alpha + \gamma ln d_{ij}$.

Thus, the probability for person k to migrate from i to any other province outside of i (interprovincial migration) is:

$$Pr({M_i}^k = 1) = \sum_{j \neq i} \frac{M_{ij}}{POP_i} = {D_i}' \sum_{j \neq i} D_j {d_{ij}}^{\gamma} \tag{5}$$

Linearizing this expression and introducing time variations and individual differences, we can write the migration choice as a linear probability model of the form:

$$Pr(M_{it}^k = 1) = \beta_1 D_{it} + \beta_2 D_{-it} + \beta_3 X^k + \delta_i + \delta_t + \varepsilon_{it}^k \quad (6)$$

where M_{it}^k is a dummy for whether the person k migrated outside of province i in year t. D_{it} is a vector of origin province i (which is the province the person k came from) in year t. We include our interested variable, college expansion measure (either college admissions, or number of college teachers), and also include other control variables which are summarized in Van der Gaag and Wissen (2003): 1. Gravity variables (population); 2. Economic variables (GDP, averaged cost of living per capita); 3. Labor market variables (average annual wage for the 5 most skilled labor intensive industries, average annual wage for the 5 most unskilled labor intensive industries, annual unemployment rate). All of the variables in D_{it} are subtracted from its mean value. D_{-it} is a "other provinces" vector, which is a weighted vector of all provinces other than i. It contains the same variables as those in D_{it}, measured at each of provinces other than i, adjusting by the distance between the central point of the origin province i and the central point of the province j, i.e.

$$D_{-it} = \sum_{j \neq p} D_{jt} \, {d_{ij}}^{\gamma} \quad (7)$$

where d_{ij} is the distance between the central point of province i and the central point of the province j. The effect of distance on migration, γ, is assumed to be the same for each pair of location for each person, which can be estimated using aggregate migration flow from equation (4). The estimation of γ is -1.26 and then we plug that into equation (7). In our analysis in equation (6), we standardize $\sum_{j \neq p} {d_{ip}}^{\gamma} = 1$. X_i is a vector of personal characteristics, including gender, age, father's schooling, and Hukou status when the person was born. δ_p is the province fixed effect, δ_t is the year fixed effect, and ε_{it}^k is an error term.

(3) Conditional Logit Model

We then use a conditional Logit model which examines choice of location to further investigate the choice process. Following the similar model assumption and structure in above, we have:

$$Pr(M_{ij}^k = 1) = \frac{e^{(u_j - u_i - c_{ij})}}{\sum_{all\ l} e^{(u_l - u_i - c_{il})}}$$

We estimate the conditional Logit model on migration between region i (origin region) and region j (destination region) for person k. We categorize China's provinces into four regions: eastern, central, western, and northeastern.

$$Pr(M_{jt}^{k}=1)=\frac{e^{(\beta_{1j}X^{k}+\beta_{2}d_{ij}+\beta_{3}Home_{j}*D_{jt}+\beta_{4}(1-Home_{j})*D_{jt}+\delta_{j}+\varepsilon_{jt}{}^{k})}}{\sum_{all\ l}e^{(\beta_{1l}X^{k}+\beta_{2}d_{il}+\beta_{3}Home_{l}*D_{lt}+\beta_{4}(1-Home_{l})*D_{lt}+\delta_{l}+\delta_{lt}+\varepsilon_{lt}{}^{k})}} \quad (8)$$

Where M_{jt}^{k} is a dummy for whether the person k migrated to region j in year t. X^{k} is the vector of personal characteristics, including gender, age, age squared, father's schooling, Hukou status when the person was born, and a dummy for whether the person migrated before. The effects of these personal characteristics are specified in regional level. d_{ij} denotes the average distance between the region i to region j. $Home_{j}$ is a dummy for whether the destination region j is the same as the home region. D_{jt} is a time-variant vector which captures the average GDP, average wage for skilled labor-intensive industries, averaged wage for unskilled labor-intensive industries, averaged unemployment rate, averaged cost of living and population in the region j (the destination province person k migrated to) at year t. We assume the effects of these variables differentiate by whether the destination region is the same as the home region. δ_{j} is the destination region fixed effect, and δ_{jt} is the region-year fixed effect, and $\varepsilon_{jt}{}^{k}$ is the error term.

5. Results

(1) Enrollment Effect

College expansion may affect the migration behavior in the age when a person makes his/her decision whether to attend a college. Increasing college enrollment opportunities in the local province may cause people who plan to attend college to stay, but greater enrollment opportunities in outside provinces may cause increases in movement to another province.

We analyze the migration decision at age 17-20, which is the typical age range when a person chooses whether to attend college or start working. t in equation (6) is thus the calendar year at age 16 for each individual k (i.e., all of the aggregate variables are measured at the calendar year at age 16 for person k). The estimation results for the migration decision at age 17-20 are shown in Table 3. In column (1), we only include our variable of interest, local college admission (AD)

and college admissions in other provinces (OTHERAD), as well as gravity variables (POP, OTHERPOP) and personal characteristics (gender (GENDER), father's schooling (FSCHOOL), and Hukou status at birth (ORIHUKOU)), but without including individual college enrollment. In column (2), we add the college degree attainment dummy (COL), which measured whether the person has a college degree at the time of survey. We use the COL as a measure of individual college enrollment to the model to see if the impact of aggregate college admissions on individual migration is mediated through individual college enrollment. In column (3), we further include labor market variables (average skilled labor wages (SWAGE, OTHERSWAGE), average unskilled labor wages (UWAGE, OTHERUWAGE) and unemployment rate (UE, OTHERUE)). Finally, in column (4), we add the interaction terms between aggregate college admissions and individual college degree attainment (as a proxy for individual college enrollment), as well as the interaction terms between labor market variables and college degree attainment to see whether there is an enrollment effect of the college expansion on migration.

We use college admissions in each province as a measure of the degree of college expansion. As we can observe in the first column of Table 3, which controls only for personal characteristics and gravity measures, college expansion in the local province decreases the probability of migration by 1.94 percentage points per 100,000 increase in college admissions. Although the estimate for the college admissions in outside provinces is positive, the magnitude of the estimated coefficient is statistically insignificant. We also observe that men are 2 percentage points more likely to migrate than women in this age range. People who were born and grew up in rural areas, which is proxied by their Hukou status at birth, are 4 percentage points more likely to migrate than those born in urban areas. Adding college degree attainment dummy in column (2), adding labor market variables in column (3), and adding both college degree attainment dummy and labor market variables in column (4) do not change the estimated results very much. Interestingly, we also find that having a college degree has a direct effect in decreasing the probability of inter-provincial migration by 0.04. This result is consistent with the migration pattern in China (see Figure 3). An explanation is that China joined the WTO in 2001, which brought many job opportunities in coastal provinces for less-skilled workers, and thus the inter-provincial migration probability increases greatly for less-skilled workers. The estimated coefficient for local unemployment rate suggests that when the local unemployment rate increases by 1 percentage points, people are 2 percentage

points less likely to migrate inter-provincially. Unemployed people may lack sufficient money or skills to migrate to another state, and thus are more likely to stay in their original provinces.

In column (5), we study the differential impacts of the college expansion on migration for college attendees and other people by adding interactions between college degree attainment, which is a proxy for individual college enrollment, with college admissions, and with labor market factors. We find that as the college admissions in outside provinces increase by 100,000, the probability of inter-provincial migration for people who were going to attend a college increase by 11 percentage points. This suggests that college expansion in other provinces attracts people who plan to attend a college to migrate inter-provincially. However, although the negative impact of local admissions does not change when adding these interactions, we do not find any statistically significant evidence to suggest that the local admissions cause college graduates more likely to stay than non-college graduates. In other words, an increase in local admissions make both who planned to attend college and who did not plan to attend college to stay. We also find that beside admissions, those who received a college degree later are more likely to migrate to another state when average wages for the skilled-worker-intensive industries increase in outside states. For every 1,000 Yuan increase in the average wage of skilled-labor-intensive industries in other provinces, the probability of migration to another province increases by 9.72 percentage points. In addition, after controlling for the interactions, the estimated coefficient for college attainment become positive (but not significant), suggesting that the higher probability of migration for non-college graduates can be mostly explained by better economic and labor market conditions.

We conclude that there is both an individual college enrollment effect, and an aggregate college enrollment effect on inter-provincial migration due to the college expansion. Specifically, as the average number of college admissions in outside provinces increase, people who later obtained a college degree are more likely to migrate to another province for ages 17-20. As local aggregate college admissions increase, both non-college graduates and college graduates are less likely to migrate to another province, but the magnitude of the effect for college attendees is not statistically significantly different from those who did not attend college. College expansion itself provides work opportunities, such as campus construction and maintenance, and boosts business related to

college education. Thus, even a person who does not attend college may be induced to stay in an area with college expansion and it is hard to distinguish the enrollment effect from this general economic effect using limited information. Also, people who later obtained a college degree are more likely to migrate as the average wage of skilled-labor-intensive industries in outside provinces increases.

(2) Competition Effect

The second channel through which college expansion may affect people's migration behavior is increasing the competition of young skilled labor when they enter the job market. An increasing number of new college graduates in a same cohort year within a province may cause new college graduates to migrate to other provinces to avoid increasing competition in the local job market.

Table 4 reports the estimated results for people's migration decisions within 3 years after graduating from their highest level of education. In this analysis, we use college admissions when the person was age 16 in the province where a person graduated from his/her highest level of education as a measure of change in supply of new skilled workers. We apply a similar model as shown in Table 3.

We observe that when not controlling for the interactions between college degree with admissions and labor market variables, the results suggest that an increase in the average college admissions of other provinces attract people migrate after graduation. For every 100,000 increase in the average admissions of other provinces when a person was 16, it increases the probability of his/her migration after graduation by about 6.6 percentage points. However, we do not find statistically significant effect of local admissions on the migration after graduation. When the weighted average unemployment rate increases in other provinces by 1 percentage point, the probability of migration decreases by 8 percentage points, which suggests inter-provincial migration is driven by employment opportunity in other provinces. Men are on average 4 percentage points more likely to migrate inter-provincially after graduation than women, and those who have an agricultural

Hukou at birth are 8 percentage points more likely to migrate than those have a non-agricultural Hukou. College dummy does not have any significant effect on migration after graduation.

After adding interactions in column (5) in Table 4, we see that college graduates are more likely to migrate inter-provincially after graduation due to increases of college admissions in other provinces (provinces other than where they graduated) in their age 16. For every 100,000 increase in average college admissions for local province, the inter-provincial migration probability for college graduates increases by about 1 percentage point. On the contrary, as average college admissions in local province increases by 100,000, the probability of migration decreases for non-college graduates decreases by 3 percentage points. An explanation is related to the competition effect that if a province admitted many college students, it will be hard for college graduates to find a job after graduation due to limiting demand for skilled workers within a province. Therefore, college graduates would migrate to a province with less competition after graduate. For non-college graduates, an explanation is that they are complementary for skilled workers in work, and therefore, more college graduates in local province attract them to stay. We do not find any significant impact of the college admissions in other provinces on either college graduates or non-college graduates. A local unemployment rate increases by 1 percentage point, the probability of migration for college graduates decreases by about 3 percentage points, and an outside unemployment rate increase by 1 percentage point decreases the probability of migration for college graduates by 17.8 percentage points. College graduates are more responsive to aggregate employment opportunity than non-college graduates for both local market and outside market.

(3) Results Using Conditional Logit Model

We use the conditional Logit model to study if college admissions affect people's migration decision to specific regions. Table 5 and Table 6 list the estimated marginal effects of admissions on migration to particular destination for ages 17-20, and the marginal effect on migration within 3 years after graduation. As described in the Model section, macro-level variables used in the conditional Logit model are measured at the regional (eastern, central, and western) level. Therefore, the estimated coefficients for each macro-level variable can be interpreted as the effect of that factor on whether an individual migrates to or stays in a given region; and the coefficient

for a personal characteristic can be interpreted as the effect of that characteristic on whether the person migrates to a specific region. Recall that region fixed effects are controlled in this model, so estimates of responses to regional macro-level variables are based on variation over time.

Table 5 and Table 6 include an interaction term between our variable of interest (AD) with the home dummy (HOME, whether the destination province is the same as the residential region at age 16), and an interaction between AD and (1-HOME). We also include all of the labor market variables as mentioned in Table 3 and Table 4, their interactions with the home dummy, and their interactions with the non-home dummy. Personal characteristics are controlled, too. Table 5 and Table 6 each have three columns that list the marginal effects of variables on migration to eastern, central, and western areas, respectively.

As can be observed from Table 5, when distance between two regions increases, people are less likely to migrate. This is consistent with other migration studies. As college admissions in a non-home region increase, people in the age range 17-20 are more likely to move to that region. When admissions increase by 10,000 in the eastern region, people who live in western and central regions are 3 percentage points more likely to migrate to the eastern region, whereas a similar admissions increase in the central or western regions induces a 2 percentage point increase in migration. Unlike the linear regression results on inter-provincial migration discussed above, the effect of local college admissions on migration disappears.

The coefficient on the HOME dummy suggests that people are much more likely to stay in their home region than migrate to another region, and those who live in eastern provinces are least likely to migrate across region. We also observe that, as the average wage in skilled-labor-intensive industries of the home region increases, people are more likely to stay in that region, and as the unemployment rate in a non-home region increases, people are less likely to migrate. However, we do not observe any significantly different effects for college attendees and non-college attendees for migration for ages 17-20.

We also observe different effects of personal variables on migration to different regions. The results suggest that people without a college degree are more likely to migrate to eastern provinces and less likely to migrate to central or western provinces. People whose Hukous are classified as agricultural are more likely to migrate to eastern provinces and less likely to migrate to central or western provinces. These results may be tied to China's entry into the WTO, which increased opportunities of jobs for less-skilled labor in the eastern provinces.

Table 6 reports the estimated marginal effect of variables on migration to each region in the 3 years after graduation using the conditional Logit model. Similar to Table 5, we observe a negative effect of distance on migration. In contrast to Table 4, we do not observe any significant effect of the increase supply of new college graduates in a region on a person's migration after graduation at regional level. The discrepancy between Table 4 and Table 6 suggests that although a large volume of new college graduates induces those seeking to attend college to migrate to another province due to competition pressure, most nonetheless stay in the same region where they obtained their degrees after graduation. Similar to Table 4, we find that college graduates are more responsive to labor market conditions when they make their migration decision after graduation. Specifically, relative to those who do not graduate from college, they are more likely to migrate to a region if the average wages increase, and when the unemployment in a region is small.

We also observe different effects of personal variables on the migration to different regions after graduation. People with college degrees are less likely to migrate to eastern provinces but more likely to migrate to central or western provinces. Those who had migrated before graduation are less likely to migrate to eastern provinces but more likely to migrate to central or western provinces.

Comparing Table 5 and Table 6 with Table 3 and Table 4, we may find some differences of migration decision making in the provincial and regional levels. The "individual enrollment effect" at ages 17-20 and the "competition effect" after graduation we observe in inter-provincial migration disappear for inter-regional migration. However, the "aggregate enrollment effect" at ages 17-20 for both college attendees and non-college attendees still exist in the regional migration model, suggesting that a province with more college admissions attracts people in ages 17-20. Also,

college graduates are more responsive to labor market conditions than non-college graduates when making inter-regional migration decision after graduation.

6. Robustness Checks

(1) Wild Bootstrap Test for Relatively Small Number of Clusters

In our regression analyses in the previous section, we cluster standard errors by the province a person lived in when he/she was age 16 (for migration at ages 17-20) or the province he/she lived in when graduating from the highest educational level (for migration after graduation). However, since the data only cover 29 provinces in mainland China, which is smaller than the standard requirement for the number of clusters in a regression, the estimated standard errors shown in Table 3 and Table 4 may be biased. If the number of clusters is small, the estimated standard errors are usually biased downward, and thus increasing t-statistics. We applied the wild bootstrap test proposed in Cameron et al. (2008, 2010) to correct the biasness of standard errors due to small number of clusters. We obtained analogous tables to Table 3 and Table 4, as shown in APTable 1 and APTable 2. We can see from these tables that although the standard errors for estimated coefficients are all larger than those shown in Table 3 and Table 4, our conclusions are not changed.

(2) Removing Migration to Eastern Provinces

During the period which we study (1992-2012), China experienced tremendous economic growth due the "Reform and Opening" policy begun in 1978, and following its entry into the WTO in 2001. The total value of exports and imports increased by almost 22 times from 1992 to 20122. Accompanying increasing volume of trade, factories in the eastern provinces expanded greatly and recruited many manufacturing workers. Attracted by higher wages, people from less-developed areas migrated to the eastern provinces. This migration trend is often identified as the dominant one in internal migration after 2001 (cite…).

[2] See the "Table 6-3 Total Value of Imports and Exports" in China Statistical Yearbook 2013, http://www.stats.gov.cn/tjsj/ndsj/2013/html/Z0603e.htm

Since our goal in this study is to identify the effect of college expansion in China on migration, which started at a year near China's entry into the WTO (1999), one concern is that we are not able to distinguish the impact of the increasing trade on migration from the impacts we try to identify. Therefore, we have removed all the migration to eastern provinces and redone the estimation of the previous section. By comparing these results with those reported above, we can check if our estimation is affected by not excluding this "main trend" in migration. Therefore, the first check on our estimation is to replicate analyses above removing migration to the eastern provinces. Specifically, in this robustness check, the migration dummy is re-defined as whether a person migrates to a non-eastern province where the destination province is not the original province. Equivalently, the outcome variable equals 1 when a person migrated to a non-eastern province outside of original province, and it equals to 0 otherwise. APTable 3 shows the estimated results of the non-eastern migration at age 17-20 and APTable 4 shows the results of the non-eastern migration in 3 years after graduation. In these tables, we estimate the same coefficients as shown in Table 3 and Table 4 (we do not report the regression results in the original column (3) of Table 3 and Table 4).

We find that after excluding the migration to eastern province, the results still indicate similar patterns as what we summarized from Table 1 and Table 2. They confirm the pattern that local college admissions reduces the probability of migration for ages 17-20, no matter whether it is to eastern or not. APTable 4 supports that the increase of local skilled worker supply (proxied by local college admissions in age 16) reduces the probability of migration for less-skilled workers. We also observe similar competition effect of local aggregate admissions on migration after graduation. However, comparing the magnitude of the estimated regression coefficients between APTable 3 and Table 3, APTable 4 and Table 4, we find that the estimated "enrollment effect" and "competition effect" are smaller in the regression of non-eastern migration. This indicates that these effects are larger for those who migrated to eastern provinces.

(3) Using Number of Teachers in Colleges as the Proxy for College Expansion

The second test is to change our measure of college expansion to be the number of teachers in colleges in each province in each year. One may argue that using number of student entrants in

colleges as the measure of college expansion may bias the estimation since although the level of college admissions is planned by the government, the final number of new entrants is directly affected by individual decisions. To check whether this potential problem causes bias, we use number of teachers in colleges as a measure of college expansion. The number of teachers is less likely to be affected by individual student decisions, but more likely related to government expansion plans.

APTable 5 and APTable 6 show the estimated results using number of college teachers as a measure for the college expansion and its impact on migration at ages 17-20 and in the 3 years after graduation. We use the same models as those used in Table 1 and Table 2, and replace the variable local college admissions and the college admissions in other provinces by local number of college teachers and the number of college teachers in other provinces.

The estimated results in APTable 5 confirm our conclusions from Table 3 that the college expansion has a positive effect on migration at 17-20 for both college-bound students and non-college-bound students. In APTable 6, we find a significant negative effect on the interaction between college degree and local number of college teachers. This supports our conclusion in Table 4 that due to the competition effect, college graduates are more likely to migrate after graduation if there is a large supply increase in skilled labor in the province of graduation.

(4) Reason for Migration

To further separate the impact of college expansion from the impact of regional economic growth on migration, we re-define the outcome variable using the "migration reason" information. Specifically, for migration decisions made for those 17-20, we re-define the outcome dummy to equal to 1 only when the migration for ages 17-20 is for studying, and 0 otherwise. The regression results are listed in APTable 7.

As can be seen from the table, when restricting migration to moves taken for education, it does not change our basic conclusions from Table 1. It still suggests that an increase in college admissions in local provinces reduces the probability of inter-provincial migration for both college graduates

and non-college graduates. Although the estimated coefficient for the interaction term between personal college degree attainment and college admissions is negative, suggesting that those who attend colleges are even less likely to move due to the increase in local admissions, it is not statistically significant. Different from what we observe in Table 1, the coefficient of the college dummy in this table suggests that if a person has obtained a college degree by the time of the survey, then he/she is more likely to migrate for education in the age range 17-20. Table 1 suggests the estimated coefficient is negative, which is probably because most non-college graduates migrate for work in these ages, as we observe in Figure 4. Also, before adding the college dummy into the model, the coefficient for Hukou is significantly negative, which suggests that people with agricultural Hukou are less likely to migrate for education in these ages. After controlling the college dummy, the negative effect of having an agricultural Hukou disappears, indicating that having a non-agricultural Hukou increases the probability of migration for education mostly through obtaining a college degree.

We also re-define the migration dummy after graduation to be 1 only when the migration is for work. By re-defining the migration dummy in this way, we may better understand the effect of an increase in the supply of skilled labor on labor-related migration decisions. The results are listed in APTable 8. The results are similar to those in Table 2, implying that the increase of local skilled labor supply drives college graduates to migrate to other provinces, but it induces non-college graduates to stay. We also find a significant positive effect of an increase of college admissions in other provinces on the migration decision of non-college graduates for work. These results further support the view that skilled workers and less-skilled workers are complementary to each other.

7. Conclusion

The college expansion in China not only provides more opportunities to students to attend college, but also affects people's migration. This paper uses the migration history information for individuals from CLDS 2012 to study how the college expansion affects migration decisions. Firstly, an increase in outside college admissions increases the probability of inter-provincial migration for college-bound students for ages 17-20. We call this an "enrollment effect" since

college-bound students migrate for attending college in other provinces as the aggregate admissions increase. However, the "enrollment effect" of local admissions on migration in age 17-20 is not clear from our analysis. The estimated results suggest that those who did not attend college are less likely to migrate as local admissions increase and little evidence suggests that the effect for college-bound students is significantly different. Since college expansion also brings economic opportunities to an area, it induces non-college graduates to stay. Then, we also find that as college admission increases, it increases the probability of migration for college graduates after graduation. We call this a "competition effect" since new college graduates face great competition from having more potential college graduates in the local market. The results suggest that when facing such competition, college graduates choose to migrate to other provinces. In addition, we use wild bootstrap test to re-estimate the linear models and obtain similar conclusions. To further exclude the effect of entering the WTO on migration, we treat those who migrated to eastern provinces as non-migrant, and it does not change our results. Using the number of college teachers as a proxy for the college expansion and restrict the reason for migration, we also obtain similar results. We use the conditional Logit model to estimate the likelihood of the migration area and find that an increase of college admissions in outside region induces people's migration for ages 17-20.

Reference

Abbott, W. F., & Schmid, C. F. (1975). University prestige and first-time undergraduate migration in the United States. Sociology of Education, 48(2), 168-185.

Anjomani, A. (2002). Regional growth and interstate migration. Socio-Economic Planning Sciences, 36(4), 239-265.

Andrienko, Y., & Guriev, S. (2004). Determinants of interregional mobility in Russia. Economics of transition, 12(1), 1-27.

Bauer, T., & Zimmermann, K. (1995). Integrating the east: the labor market effects of immigration (Working Paper No. 5). Retrieved from American Institute for Contemporary German Studies.

Bauer, T., & Zimmermann, K. F. (1997). Network migration of ethnic Germans. International Migration Review, 31(1), 143-149.

Black, D., Gates, G., Sanders, S., & Taylor, L. (2000). Demographics of the gay and lesbian population in the United States: Evidence from available systematic data sources. Demography, 37(2), 139-154.

Böckerman, P., & Haapanen, M. (2013). The effect of polytechnic reform on migration. Journal of population Economics, 26(2), 593-617.

Borjas, G. J., & Bronars, S. G. (1991). Immigration and the Family. Journal of Labor Economics, 9(2), 123-148.

Boyle, P. J., & Halfacree, K. H. (1995). Service class migration in England and Wales, 1980–1981: Identifying gender-specific mobility patterns. Regional Studies, 29(1), 43-57.

Cadwallader, M. T. (1992). Migration and residential mobility: Macro and micro approaches. Univ of Wisconsin Press.

Carrington, W. J., Detragiache, E., & Vishwanath, T. (1996). Migration with endogenous moving costs. The American Economic Review, 909-930.

Champion, T., Fotheringham, S., Rees, P., Boyle, P., & Stillwell, J. (1998). The determinants of migration flows in England: a review of existing data and evidence. A report prepared for the

Department of the Environment, Transport and the Regions. Department of Geography, University of Leeds.

Chen, Y., & Rosenthal, S. S. (2008). Local amenities and life-cycle migration: Do people move for jobs or fun?. Journal of Urban Economics, 64(3), 519-537.

Cobb Clark, D. A. (1990). Immigrant selectivity: The roles of household structure and US immigration policy (Doctoral dissertation).

Cooke, T. J., & Boyle, P. (2011). The migration of high school graduates to college. Educational Evaluation and Policy Analysis, 33(2), 202-213.

Cushing, B., & Poot, J. (2004). Crossing boundaries and borders: Regional science advances in migration modelling. Papers in regional science, 83(1), 317-338.

DaVanzo, J. (1978). Does unemployment affect migration? Evidence from micro data. The Review of Economics and Statistics, 504-514.

Daveri, F., & Faini, R. (1999). Where do migrants go?. Oxford Economic Papers, 51(4), 595-622.

Ederveen, S., & Bardsley, N. (2003). The influence of wage and unemployment differentials on labour mobility in the EU: A meta-analysis. In conference "Ageing and Welfare Systems: What Have We Learned", Brussels, January 2003.

Gottlieb, P. D., & Joseph, G. (2006). College-to-work migration of technology graduates and holders of doctorates within the United States. Journal of Regional Science, 46(4), 627-659.

Graves, P. E., & Linneman, P. (1979). Household migration: Theoretical and empirical result. Journal of urban economics, 6(3), 383-404.

Greenwood, M. J. (1975). Research on internal migration in the United States: A survey. Journal of Economic Literature, 397-433.

Greenwood, M. J. (1985). Human migration: Theory, models, and empirical studies. Journal of regional Science, 25(4), 521-544.

Greenwood, M. J. (1997). Internal migration in developed countries. Handbook of population and family economics, 1, 647-720.

Faggian, A., McCann, P., & Sheppard, S. (2007). Human capital, higher education and graduate migration: an analysis of Scottish and Welsh students. Urban Studies, 44(13), 2511-2528.

Faggian, A., & Franklin, R. S. (2014). Human capital redistribution in the USA: the migration of the college-bound. Spatial Economic Analysis, 9(4), 376-395.

Fenske, R. H. (1972). College Student Migration. The American College Testing Program

Fu, Y., & Gabriel, S. A. (2012). Labor migration, human capital agglomeration and regional development in China. Regional Science and Urban Economics, 42(3), 473-484.

Harris, J. R., & Todaro, M. P. (1970). Migration, unemployment and development: a two-sector analysis. The American Economic Review, 60(1), 126-142.

Kodrzycki, Y. K. (2001). Migration of recent college graduates: evidence from the national longitudinal survey of youth. New England Economic Review, 1(1), 13-34.

Kyung, W. (1992). Determinants of in-migration of college students to the state of New York. Center for Urban Studies Publications and Reports.

Ishitani, T. T. (2011). The determinants of out-migration among in-state college students in the United States. Research in Higher Education, 52(2), 107-122.

Levy, M. B., & Wadycki, W. J. (1974). Education and the decision to migrate: An econometric analysis of migration in Venezuela. Econometrica: journal of the Econometric Society, 42(2), 377-388.

Li, F., Liu, F., & Guo, Z. (2009). An Empirical Study of Migration in Postgraduate Employment. Tsinghua Journal of Education, 30(4), 67-71.

Liu, Y., & Shen, J. (2014). Spatial patterns and determinants of skilled internal migration in China, 2000–2005. Papers in Regional Science, 93(4), 749-771.

Liu, Y., Shen, J., Xu, W., & Wang, G. (2017). From school to university to work: migration of highly educated youths in China. The Annals of Regional Science, 59(3), 651-676.

Machin, S., Salvanes, K. G., & Pelkonen, P. (2012). Education and mobility. Journal of the European Economic Association, 10(2), 417-450.

Mak, J., & Moncur, J. E. (2003). Interstate migration of college freshmen. The Annals of Regional Science, 37(4), 603-612.

Malamud, O., & Wozniak, A. (2012). The impact of college on migration evidence from the Vietnam generation. Journal of Human Resources, 47(4), 913-950.

McHenry, P. (2013). The relationship between schooling and migration: Evidence from compulsory schooling laws. Economics of Education Review, 35, 24-40.

Mincer, J. (1978). Family migration decisions. Journal of political Economy, 86(5), 749-773.

Mixon Jr, F. G., & Hsing, Y. (1994). The determinants of out-of-state enrollments in higher education: A tobit analysis. Economics of Education Review, 13(4), 329-335.

Mueser, P. R., & Graves, P. E. (1995). Examining the role of economic opportunity and amenities in explaining population redistribution. Journal of Urban Economics, 37(1), 1-25.

Newbold, K. B. (2001). Measuring internal migration among the foreign-born: Insights from Canadian data. Review of Regional Studies, 31(2), 177-195.

Parikh, A., & Van Leuvensteijn, M. (2003). Internal migration in regions of Germany: A panel data analysis. Applied Economics Quarterly, 49(2), 173-192.

Plane, D. A., & Bitter, C. (1997). The Role Of Migration Research In Regional Science1. Papers in Regional Science, 76(2), 133-153.

Rogers, A., Raquillet, R., & Castro, L. J. (1978). Model migration schedules and their applications. Environment and Planning A, 10(5), 475-502.

Roy, A. D. (1951). Some thoughts on the distribution of earnings. Oxford economic papers, 3(2), 135-146.

Schultz, T. W. (1961). Investment in human capital. The American economic review, 51(1), 1-17.

Schwartz, A. (1973). Interpreting the effect of distance on migration. Journal of political economy, 81(5), 1153-1169.

Schwartz, A. (1976). Migration, age, and education. Journal of Political Economy, 84(4, Part 1), 701-719.

Sjaastad, L. A. (1962). The costs and returns of human migration. Journal of Political Economy, 70(5, Part 2), 80-93.

Tornatsky, L. G. (2001). Who Will Stay and who Will Leave?: Individual, Institutional and State-level Predictors of State Retention of Recent Science and Engineering Graduates, Policy and Research Recommendations. Southern Growth Policies Board.

Spilimbergo, A., & Hanson, G. H. (1996). Illegal Immigration, Border Enforcement, and Relative Wages: Evidence from Apprehensions at the US-Mexico Border (NBER Working Paper No. 5592). Retrieved from National Bureau of Economic Research website: https://www.nber.org/papers/w5592.

Stark, O., & Bloom, D. E. (1985). The new economics of labor migration. The american Economic review, 75(2), 173-178.

Steahr, T. E., & Lowe, R. A. (1975). Patterns and Trends of College and University Student Migration in the United States. Storrs Agricultural Experiment Station, University of Connecticut (54).

Tuckman, H. P. (1970). Determinants of college student migration. Southern Economic Journal, 184-189.

Van der Gaag, N., van Wissen, L., Rees, P., Stillwell, J., & Kupiszewski, M. (2003). Study of past and future interregional migration trends and patterns within European Union countries: I~~i~~n search of a generally applicable explanatory model, Eurostat Report 2002/S 67-052015/EN, Luxembourg City.

Wolpert, J. (1965). Behavioral aspects of the decision to migrate. Papers of the Regional Science Association, 15(1), 159-169.

Wozniak, A. (2010). Are college graduates more responsive to distant labor market opportunities?~~.~~ Journal of Human Resources, 45(4), 944-970.

Young, A. (2013). Inequality, the urban-rural gap, and migration. The Quarterly Journal of Economics, 128(4), 1727-1785.

Yousefi, M., & Rives, J. (1987). Migration behavior of college graduates: an empirical analysis. Journal of Behavioral Economics, 16(3), 35-49.

Yue, C. J., & Zhou, J. B. (2005). Why Do the College Graduates Choose Inter-province Employment. Tsinghua Journal of Education, 2, 34-41.

Yue, D. (2010). Factors affecting employment opportunities for college graduates. China Higher Education Research, 11, 68-71.

Tables

Table 1 Summary Statistics on the CLDS 2012 Sample

	All	Birth Cohort 1952-1962	Birth Cohort 1963-1972	Birth Cohort 1973-1982
All Sample				
Age	37.57	54.83	44.35	34.73
	(13.48)	(3.38)	(2.86)	(2.93)
Male	0.51	0.51	0.51	0.51
	(0.50)	(0.50)	(0.50)	(0.50)
Schooling	9.14	8.02	8.91	9.49
	(3.28)	(3.53)	(3.08)	(3.17)
Migrant Sample				
Migration Rate	0.16	0.08	0.14	0.22
	(0.36)	(0.28)	(0.34)	(0.42)
Reason of First Migration				
Political	5.86	24.1	4.76	4.17
Family	9.31	16.07	8.57	7.16
Work	70.43	49.95	78.21	79.18
Education	9.27	0.81	3.00	5.52
Others	5.14	9.06	5.47	3.96
First Migration Age	20.88	27.27	24.51	20.58
	(7.47)	(12.59)	(8.57)	(5.29)
First Migration Destination				
Eastern	56.05	45.11	49.65	57.5
Central	17.85	23.02	23.65	14.16
Western	17.59	15.39	18.27	20.47
Northeastern	8.51	16.48	8.43	7.87
Schooling	9.44	8.53	8.72	9.56
	(3.12)	(3.21)	(2.77)	(3.06)

*This table lists the means and standard deviations for the CLDS sample in terms of demographic information (age, gender, years of schooling), migration rate, and reasons of migration by birth cohort. It also lists the means and standard deviations of demographic information and the distribution of migration region for migrant sample by birth cohort.

Table 2 Summary Statistics for Migrants by Reason for Migration

	Family		Work		Education	
Migration Cohort	1978- 1998	1999-2002	1978- 1998	1999-2002	1978- 1998	1999-2002
Age at Migration	18.89	24.77	20.75	22.33	16.70	17.78
	(8.69)	(10.08)	(5.53)	(7.98)	(4.52)	(4.01)
Schooling	8.46	9.21	8.59	9.30	13.52	13.32
	(3.46)	(3.07)	(2.46)	(3.01)	(2.48)	(2.69)
Male	0.27	0.25	0.65	0.59	0.74	0.54
	(0.44)	(0.44)	(0.48)	(0.49)	(0.44)	(0.50)
Hukou	0.89	0.87	0.92	0.93	0.64	0.75
Status at Birth	(0.31)	(0.33)	(0.27)	(0.26)	(0.48)	(0.43)
Area						
Eastern	39.94	34.36	60.95	64.99	41.92	39.30
Central	22.04	26.11	16.96	13.04	23.30	33.88
Western	26.99	18.01	15.64	14.59	30.88	23.81
Northeastern	11.03	21.51	6.45	7.39	3.41	3.01

*This table lists the means and standard deviations for demographic information (gender, age and years of schooling at migration, Hukou status at birth) and destination regions by migration cohort (1978-1998, 1999-2012).

Table 3 Estimated Results of Equation (6) on Migration Decision in Age 17-20

Mig_1720	Coef. (SE)	Coef. (SE)	Coef. (SE)	Coef. (SE)	Coef. (SE)
	(1)	(2)	(3)	(4)	(5)
Col*AD					0.007 (0.010)
Col *otherAD					0.110** (0.041)
Col *Swage					-0.006 (0.006)
Col*otherSwage					0.097** (0.046)
Col *Uwage					0.010 (0.010)
Col *otherUwage					-0.099 (0.059)
Col *UE					-0.006 (0.012)
Col *otherUE					-0.046 (0.035)
AD	-0.019** (0.008)	-0.020* (0.011)	-0.019** (0.008)	-0.019* (0.011)	-0.020* (0.010)
Swage		-0.004 (0.003)		-0.003 (0.003)	-0.002 (0.004)
Uwage		-0.003 (0.005)		-0.003 (0.005)	-0.004 (0.006)
UE		-0.020** (0.008)		-0.019** (0.008)	-0.017* (0.009)
POP	0.028 (0.099)	0.088 (0.16)	0.030 (0.100)	0.075 (0.162)	0.062 (0.162)
otherAD	-0.042 (0.088)	-0.01 (0.07)	-0.040 (0.087)	-0.013 (0.073)	0.008 (0.071)
otherSwage		-0.003 (0.003)		-0.001 (0.028)	-0.013 (0.029)
otherUwage		0.001 (0.001)		0.013 (0.033)	0.024 (0.036)
otherUE		-0.025 (0.025)		-0.028 (0.026)	-0.018 (0.025)
otherPOP	-0.230 (2.90)	-0.001 (0.001)	-0.180 (2.89)	-0.540 (3.092)	-0.682 (2.971)

Col			-0.036**	-0.036**	0.010
			(0.014)	(0.014)	(0.016)
Fschool	0.001	0.001	0.002	0.001	0.001
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Gender	0.024**	0.024**	0.023**	0.023**	0.024**
	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)
Hukou	0.044**	0.044**	0.031**	0.031**	0.030**
	(0.017)	(0.017)	(0.014)	(0.014)	(0.014)
Provincial FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
N	4,270	4,270	4,270	4,270	4,270
R^2	0.0541	0.0562	0.0557	0.0578	0.0608

*This table reports the estimation results of equation (6) of migration for ages 17-20. AD stands for college admissions in a person's residential province year at age 16 (unit: 100,000); SWAGE is the average wage of skilled-labor-intensive industries in the calendar year when the person is age 16 in the origin province (unit: 1,000); UWAGE is the average wage of unskilled-labor-intensive industries in calendar when the person is age 16 in the origin province (unit: 1,000); UE is the unemployment rate at calendar year of a person's age 16 in the origin province (unit: 1 percentage point); POP is the total population at calendar year of a person's age 16 in the origin province (unit: 100,000,000). Each of the macro-level variables is coded as the differences between raw values and the overall mean. All of the variables with the "other" prefix are weighted measures of the outside provinces of the origin province. FSCHOOL is the years of father's schooling. GENDER is a dummy for whether a person is male. HUKOU is a dummy for whether a person was agricultural Hukou at birth.

Table 4 Estimated Results of Equation (6) on Migration Decision Within 3 Years After Graduation

Mig_gra	Coef. (SE)	Coef. (SE)	Coef. (SE)	Coef. (SE)	Coef. (SE)
	(1)	(2)	(3)	(4)	(5)
Col*AD					0.041*
					(0.021)
Col *otherAD					0.027
					(0.035)
Col *Swage					-0.009
					(0.009)
Col*otherSwage					-0.028
					(0.028)
Col *Uwage					0.012
					(0.016)
Col *otherUwage					0.026
					(0.038)
Col *UE					0.052*
					(0.031)
Col *otherUE					-0.170***
					(0.062)
AD	-0.028	-0.028	-0.022	-0.022	-0.032*
	(0.017)	(0.018)	(0.018)	(0.018)	(0.019)
Swage			0.005	0.005	0.006
			(0.006)	(0.006)	(0.008)
Uwage			0.010	0.010	0.010
			(0.010)	(0.010)	(0.012)
UE			-0.015	-0.017	-0.017
			(0.012)	(0.012)	(0.013)
POP	-0.042**	-0.043**	-0.023	-0.022	-0.022
	(0.018)	(0.018)	(0.021)	(0.021)	(0.023)
otherAD	0.066**	0.065**	0.060**	0.058**	0.033
	(0.026)	(0.029)	(0.027)	(0.029)	(0.037)
otherSwage			0.049**	0.050**	0.015
			(0.023)	(0.023)	(0.029)
otherUwage			0.011	0.011	-0.008
			(0.032)	(0.032)	(0.040)
otherUE			-0.080***	-0.080***	-0.070**
			(0.030)	(0.030)	(0.030)
otherPOP	-0.070	-0.070	-0.080	-0.079	0.085
	(0.117)	(0.117)	(0.167)	(0.167)	(0.169)

Col		-0.010		-0.010	0.072
		(0.03)		(0.030)	(0.068)
Fschool	0.003	0.003	0.003	0.003	0.002
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Gender	0.042***	0.042***	0.042***	0.042***	0.042***
	(0.011)	(0.011)	(0.011)	(0.011)	(0.013)
Hukou	0.080***	0.080***	0.080***	0.080***	0.080***
	(0.020)	(0.020)	(0.020)	(0.020)	(0.020)
MB	-0.010	-0.010	-0.010	-0.010	-0.010
	(0.030)	(0.030)	(0.030)	(0.030)	(0.030)
Provincial FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
N	3,182	3,182	3,182	3,182	3,182
R^2	0.0673	0.0694	0.0870	0.0880	0.0897

*This table reports the estimation results of equation (6) for migration after graduation. AD stands for college admissions in a person's residential province year at age 16 (unit: 100,000); SWAGE is the average wage of skilled labor-intensive industries in the calendar year when the person in the age of graduation from highest education in the province of graduation (unit: 1,000); UWAGE is the average wage of unskilled labor intensive industries in calendar when the person in the age of graduation from highest education in the province of graduation (unit: 1,000); POP is the total population at calendar year of a person's age of graduation in the province of graduation (unit: 100,000,000). Each of the macro-level variables is coded as the differences between raw values and the overall mean. All of the variables with the "other" prefix are weighted measures of the outside provinces of the origin province. FSCHOOL is the years of father's schooling. GENDER is a dummy for whether a person is male. HUKOU is a dummy for whether a person was agricultural Hukou at birth.

Table 5 Marginal Effects on Migration Decision in Age 17-20 Using McFadden's Conditional Logit Model

	ME (SE)	ME (SE)	ME (SE)
	Eastern (1)	Central (2)	Western (3)
Col*AD	-0.018 (0.021)	-0.011 (0.013)	-0.008 (0.010)
Col *otherAD	0.028 (0.023)	0.021 (0.017)	0.013 (0.011)
Col *Swage	-0.049 (0.105)	-0.035 (0.076)	-0.023 (0.049)
Col*otherSwage	0.083 (0.095)	0.061 (0.070)	0.039 (0.046)
Col *Uwage	0.079 (0.108)	0.091 (0.123)	0.058 (0.082)
Col *otherUwage	-0.029 (0.174)	-0.021 (0.127)	-0.014 (0.081)
Col *UE	0.014 (0.172)	0.010 (0.125)	0.006 (0.081)
Col *otherUE	0.075 (0.147)	0.054 (0.109)	0.035 (0.069)
AD	-0.016 (0.065)	-0.012 (0.048)	-0.010 (0.030)
Swage	0.077* (0.040)	0.056* (0.030)	0.036* (0.021)
Uwage	-0.001 (0.062)	-0.001 (0.044)	-0.001 (0.028)
UE	0.101 (0.069)	0.074 (0.053)	0.047 (0.035)
POP	-0.003 (0.296)	0.002 (0.215)	0.002 (0.138)
otherAD	0.034*** (0.010)	0.023*** (0.008)	0.015** (0.006)
otherSwage	-0.003 (0.028)	-0.002 (0.021)	-0.002 (0.013)
otherUwage	0.012 (0.039)	0.009 (0.029)	0.006 (0.019)
otherUE	-0.131* (0.058)	-0.095** (0.045)	-0.061* (0.033)
otherPOP	-0.463 (0.297)	-0.337 (0.223)	-0.216 (0.154)

Distance	-0.090***	-0.066***	0.042***
	(0.032)	(0.027)	(0.018)
Home	0.603***	0.439***	0.281**
	(0.166)	(0.143)	(0.112)
Fschool	0.004	0.001	-0.004
	(0.004)	(0.001)	(0.003)
Gender	0.011	-0.017	0.006
	(0.030)	(0.027)	(0.018)
Hukou	0.176**	-0.132*	-0.044
	(0.078)	(0.073)	(0.044)
Col	-0.294	0.260**	0.033
	(0.189)	(0.119)	(0.126)
Provincial FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
N	14,640	14,640	14,640
Wald Chi^2	1308.45	1308.45	1308.45

*This table reports the marginal effects of equation (7) for ages 17-20 using the McFadden's conditional Logit model. AD stands for the average annual college admissions for provinces in a person's residential region at age 16 (home region); SWAGE is the average wage of skilled-labor-intensive industries in the home region in the calendar year when the person is age 16; UWAGE is the average wage of unskilled-labor-intensive industries in the home region in the calendar year when the person is age 16; UE is the unemployment rate in the home region in the calendar year when the person is age 16; POP is the total population in the home region in the calendar year when the person is age 16. Each of the macro-level variables is coded as the differences between raw values and the overall mean. FSCHOOL is the years of father's schooling. GENDER is a dummy for whether a person is male. HUKOU is a dummy for whether a person was in an agricultural Hukou at birth. DISTANCE is the measure of average distance between the provinces of the original region and the provinces of a particular destination region. HOME is a dummy for whether the destination region is the same as the original region. All the variables with the "other" prefix are the corresponding variable times (1-HOME).

Table 6 Marginal Effects on Migration Decision Within 3 Years After Graduation Using McFadden's Conditional Logit Model

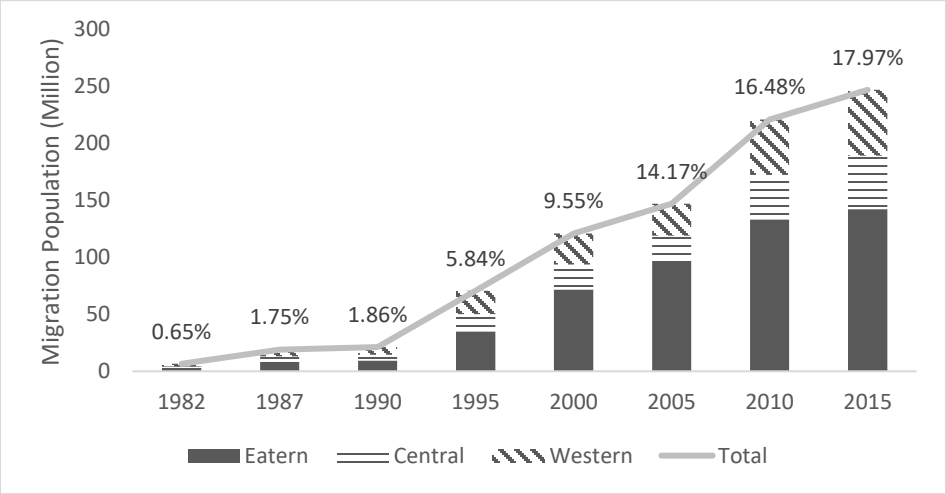
	ME (SE)	ME (SE)	ME (SE)
	Eastern (1)	Central (2)	Western (3)
Col*AD	-0.006	-0.004	-0.002
	(0.011)	(0.008)	(0.005)
Col *otherAD	0.007	0.005	0.003
	(0.012)	(0.008)	(0.005)
Col *Swage	0.054**	0.036**	0.023*
	(0.026)	(0.017)	(0.013)
Col*otherSwage	0.084**	0.052**	0.035*
	(0.033)	(0.024)	(0.018)
Col *Uwage	0.169***	-0.111***	0.071**
	(0.060)	(0.042)	(0.033)
Col *otherUwage	0.192***	0.127***	0.081**
	(0.068)	(0.049)	(0.038)
Col *UE	-0.241**	-0.158*	-0.101
	(0.133)	(0.093)	(0.066)
Col *otherUE	-0.367**	-0.242**	-0.154*
	(0.152)	(0.109)	(0.083)
AD	0.025	0.002	0.001
	(0.049)	(0.003)	(0.002)
Swage	0.030	0.020	0.013
	(0.025)	(0.017)	(0.011)
Uwage	-0.036	-0.023	-0.015
	(0.039)	(0.026)	(0.017)
UE	0.020	0.013	0.008
	(0.041)	(0.027)	(0.017)
POP	0.012	0.008	0.050
	(0.019)	(0.012)	(0.080)
otherAD	-0.001	-0.001	-0.001
	(0.004)	(0.003)	(0.002)
otherSwage	0.027	0.018	0.011
	(0.023)	(0.015)	(0.010)
otherUwage	-0.018	-0.012	-0.008
	(0.029)	(0.019)	(0.012)
otherUE	0.098**	0.064**	0.041*
	(0.044)	(0.032)	(0.023)
otherPOP	-0.014	-0.010	-0.058
	(0.018)	(0.012)	(0.081)

Distance	-0.073***	-0.048**	-0.030*
	(0.050)	(0.022)	(0.016)
Home	0.137	0.090	0.058
	(0.098)	(0.067)	(0.046)
Fschool	0.004	-0.002	-0.002
	(0.003)	(0.002)	(0.002)
Gender	-0.003	0.001	0.002
	(0.018)	(0.014)	(0.011)
Hukou	0.062	-0.048	-0.014
	(0.043)	(0.035)	(0.024)
Col	-0.219*	0.108	0.110*
	(0.120)	(0.087)	(0.064)
MB	-0.133**	0.094*	0.039
	(0.065)	(0.049)	(0.033)
Provincial FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
N	9,546	9,546	9,546
Wald Chi^2	1086.10	1086.10	1086.10

*This table reports the marginal effects of equation (7) for migration in 3 years after graduation using the McFadden's conditional Logit model. AD stands for the average annual college admissions in a person's residential region at age 16 (home region); SWAGE is the average wage of skilled-labor-intensive industries in the region of graduation in the calendar year when the person graduated; UWAGE is the average wage of unskilled-labor-intensive industries in the region of graduation in the calendar year when the person graduated; UE is the unemployment rate in the region of graduation in the calendar year when the person graduated; POP is the total population in the region of graduation in the calendar year when the person graduated. All the macro-level variables are measured by their differences between raw values and the overall mean. FSCHOOL is the years of father's schooling. GENDER is a dummy for whether a person is male. HUKOU is a dummy for whether a person was in an agricultural Hukou at birth. DISTANCE is the measure of average distance between the provinces of the original region and the provinces of the destination region. HOME is a dummy for whether the destination region is the same as the original region. HOME is a dummy for whether the destination region is the same as the origin region. All the variables with the "other" prefix are the corresponding variable times (1-HOME).

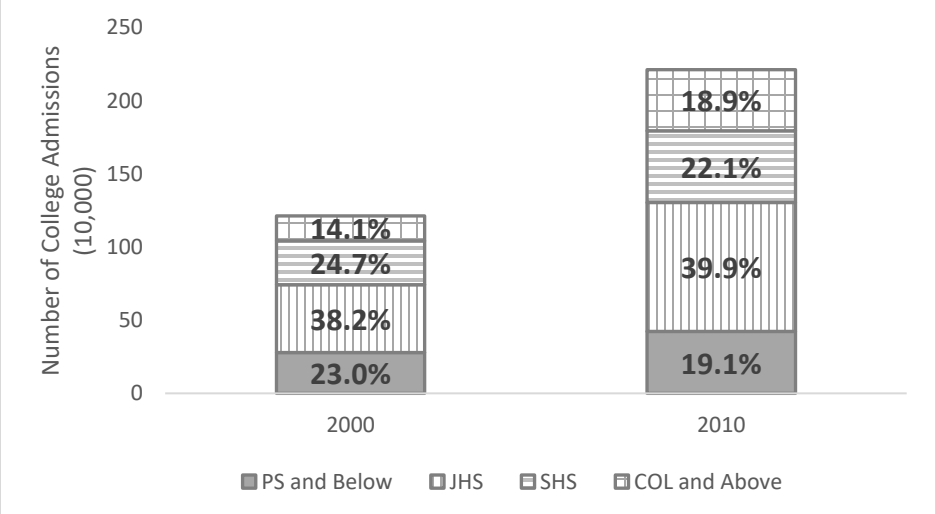
Figures

Figure 1 The Floating Population3 and Its Regional Distribution in China



*This chart shows the total size and the regional distribution of the floating population in China from 1982 to 2015. The y-axis denotes the population (unit: 1 million), solid area in each bar denotes the proportion where the migration destination is in the eastern provinces, the patterned area with horizontal lines denotes central provinces, and the patterned area filled by slash denotes western provinces. The trend line plots the floating population , and the percentage above each bar denotes the percentage of migrants in total population of the corresponding year.(Source: China's Census in 1982, 1990, 2000, 2010; and 1% National Sample Survey in 1987, 1992, 2005 and 2015).

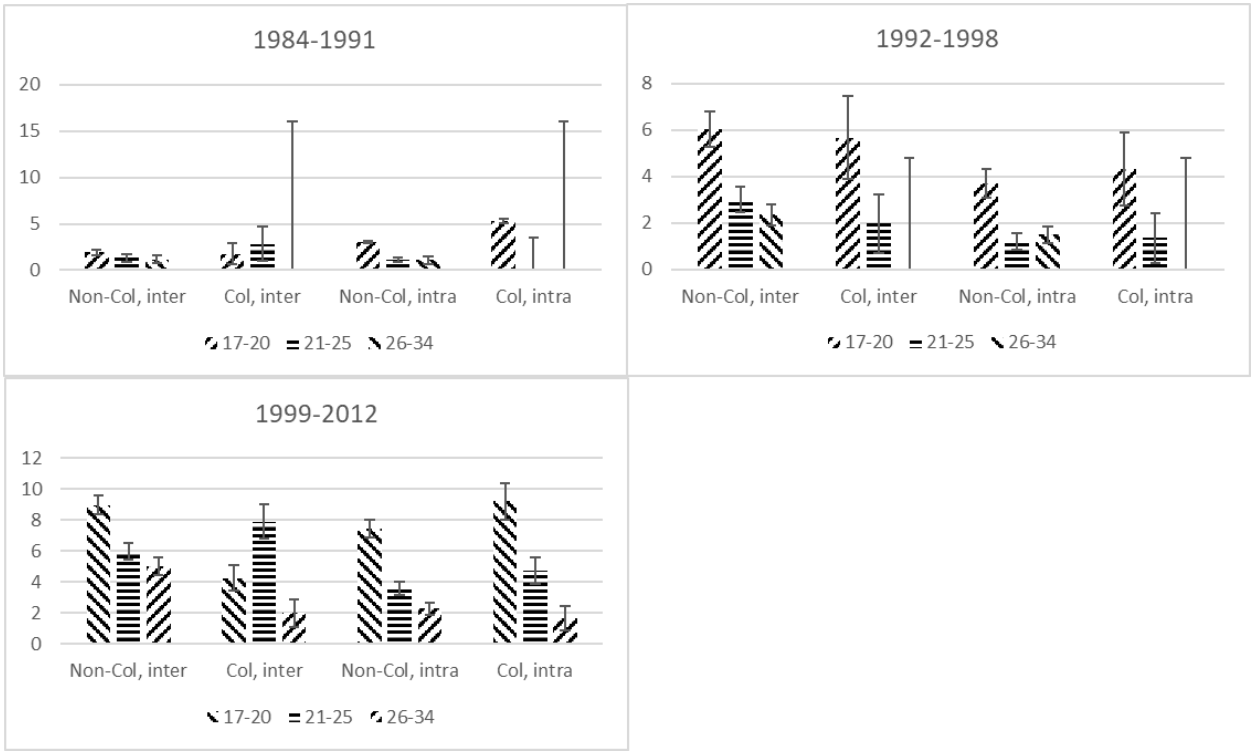
Figure 2 Educational Distribution of Migrants in China



*This chart shows the total size and the educational distribution of the floating population in China in 2000 and 2010. The y-axis denotes the size of the population (unit: 10,000), blue area in each bar denotes the proportion of this population whose have less than primary school, orange area denotes the proportion of having primary school education, and gray area denotes the proportion of having middle school education, yellow area denotes high school education, and blue areas denote college education and above (Source: China's Census in 2000 and 2010).

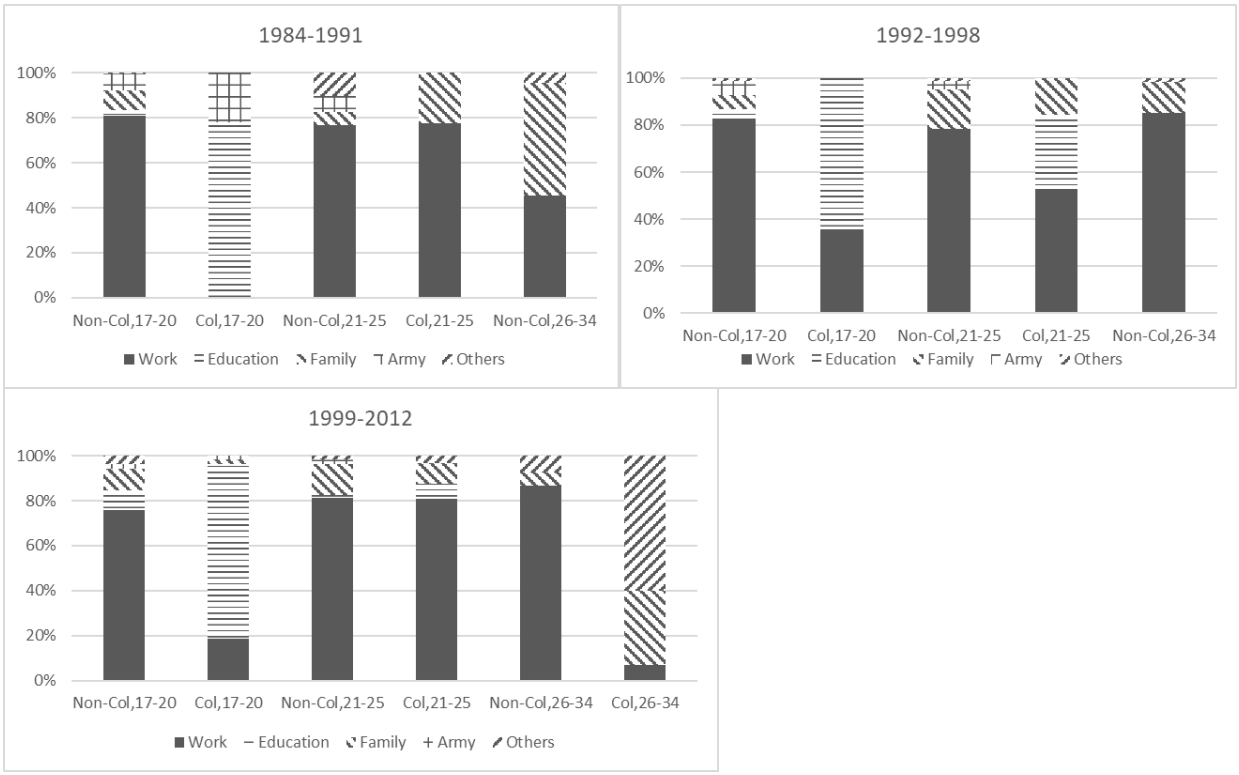
[3] The floating population includes those whose registered addresses (Hukous) are in a different county than from residential address (different in county level) for at least 6 months.

Figure 3 Inter-provincial and Intra-provincial Migration Rates by Age Group and by Education in Three Time Periods



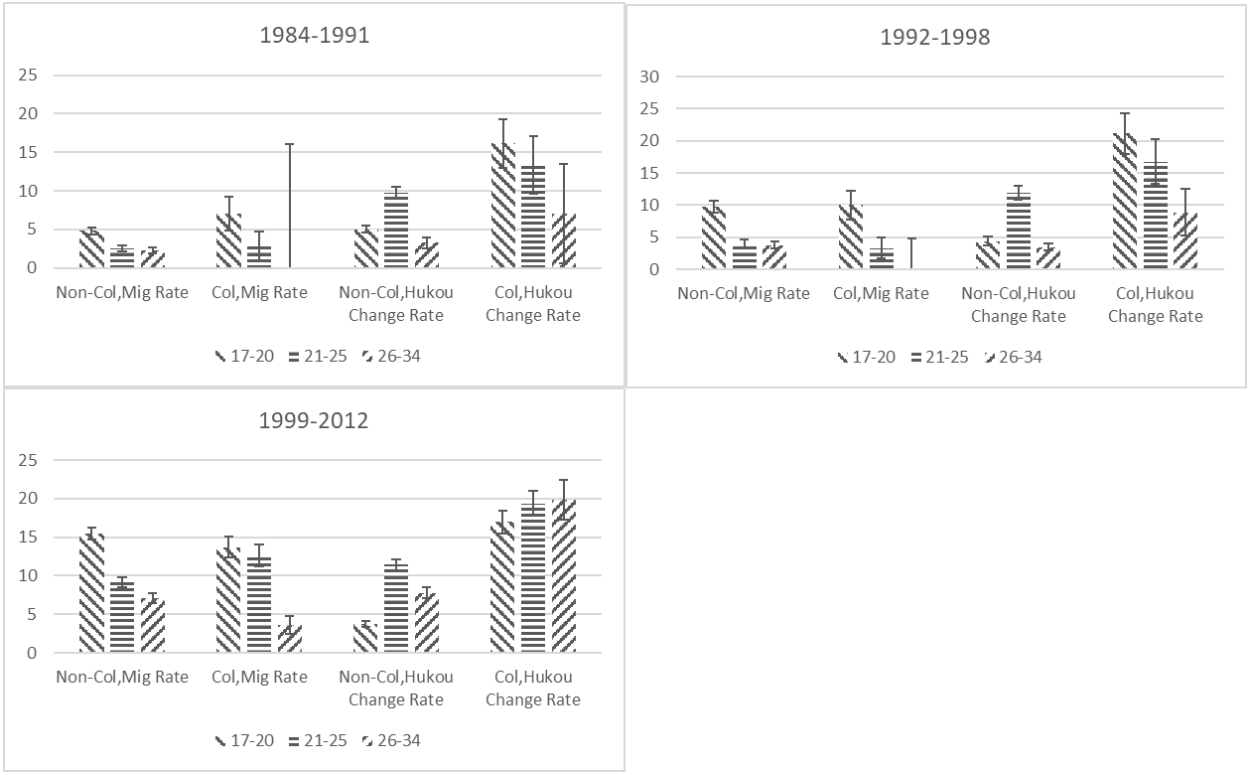
*This chart shows the inter-province and intra-province migration rates and their 95% confidence intervals by education and by age group for migration in years 1984-1991, 1992-1998, and 1999-2012. The y-axis denotes the migration rate in percent, backward slash bars denote the migration rates for ages 17-20, horizontal line bars denote the migration rates for ages 21-25, and the slash bars denote the migration rates in ages 26-34. The migration rates are calculated using the number of people who migrated in a time period and migrated in a specified age range, and who were the specified ages entirely within the time period, divided by the number of respondents who were the specified ages entirely within the time period. The migration rates are calculated using the CLDS 2012 sample.

Figure 4 Distribution of Migration Reasons by Education and Age Group



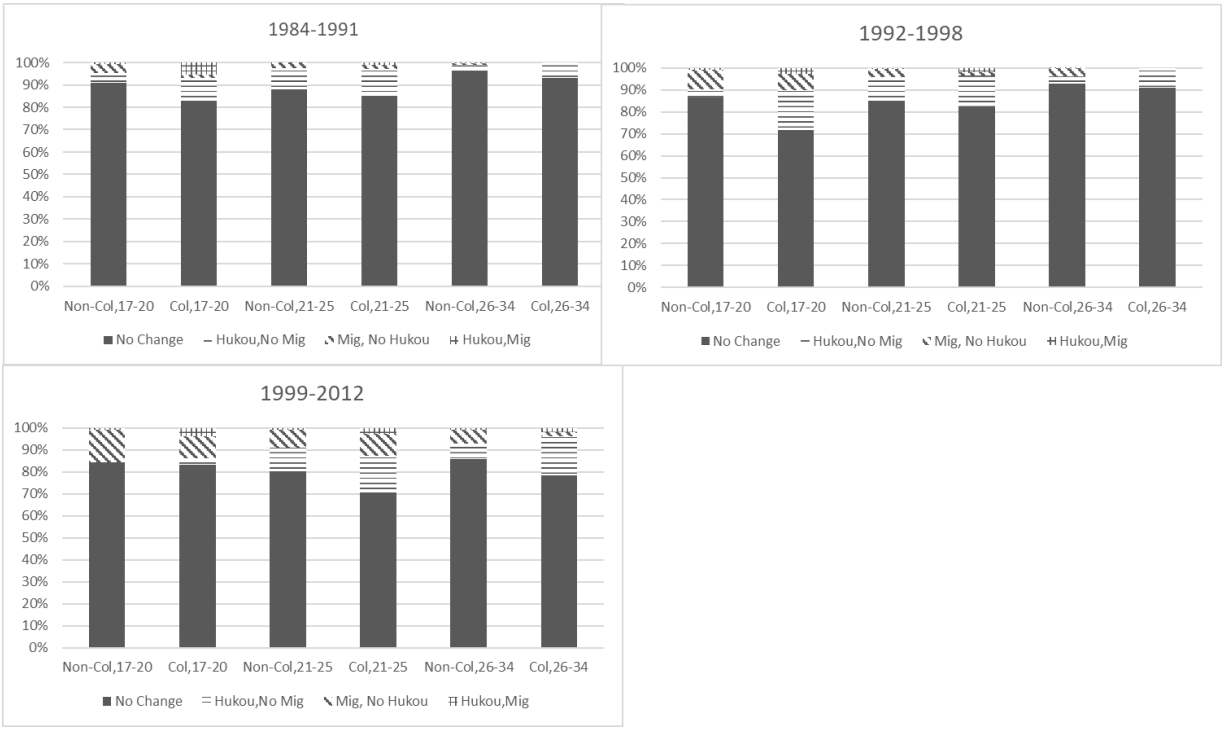
*This chart shows the distribution of migration reasons by education and by age group in 1984-1991, 1992-1998, and 1999-2012. The y-axis denotes the proportion of each migration reason among all migrants in an age group. From bottom to the top of each bar, the migration reasons can be summarized as for work, for education, for family, for political reasons, and other reasons. We use the migration history data in the CLDS 2012 to calculate these proportions.

Figure 5 Migration Rates and Hukou Change Rates by Age Group and by Education



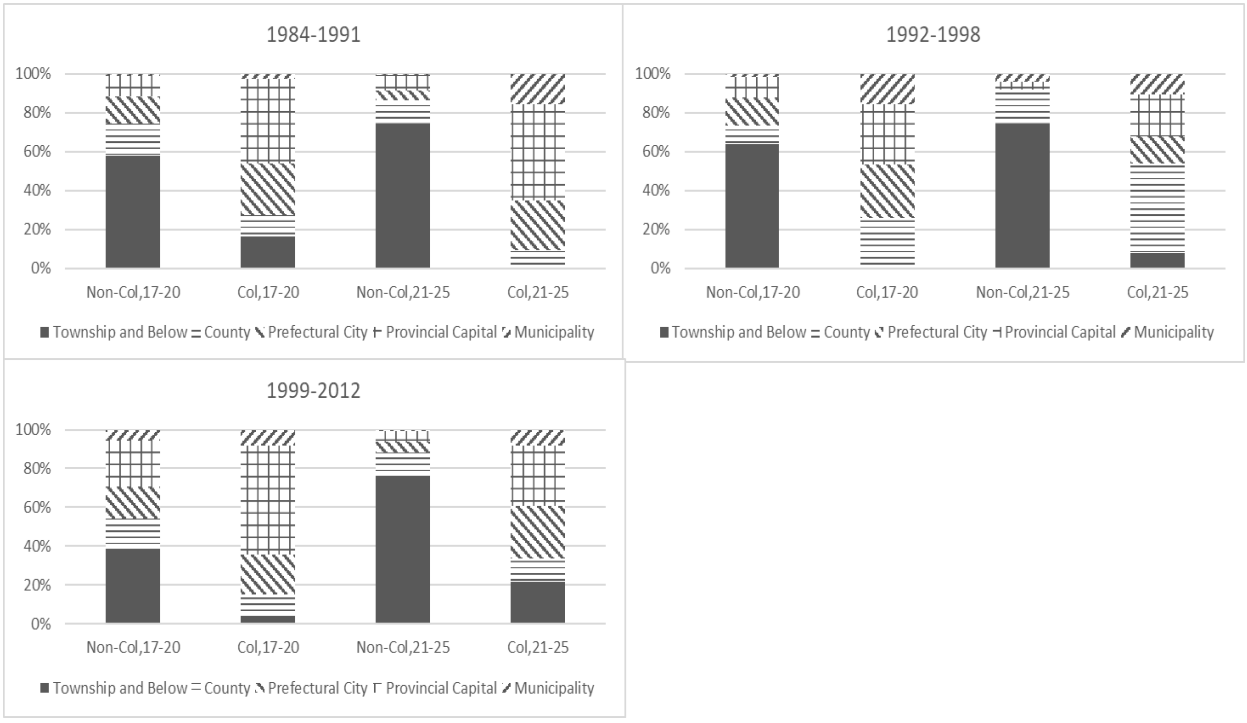
*This chart shows the migration rates and Hukou change rates by education and by age group in 1984-1991, 1992-1998, 1999-2012. The y-axis denotes migration rate in percentage, backward slash bars denote the rates in age 17-20, horizontal line bars denote the rates in age 21-25, and the slash bars denote the rates in age 26-34. The migration rates are calculated using the number of people in a specified age range, who migrated in a given time period and spent the entire specified ages in the time period, divided by the number of respondents whose specified age range is covered by the time period. The Hukou change rates are calculated using the number of people who changed Hukou in a given time period and in a specified age range, divided by the number of respondents in the specified age range and time period. The migration rates and Hukou change are calculated using the CLDS 2012 sample.

Figure 6 Proportion of Different Situations of Migration and Hukou change by Age Group and by Education



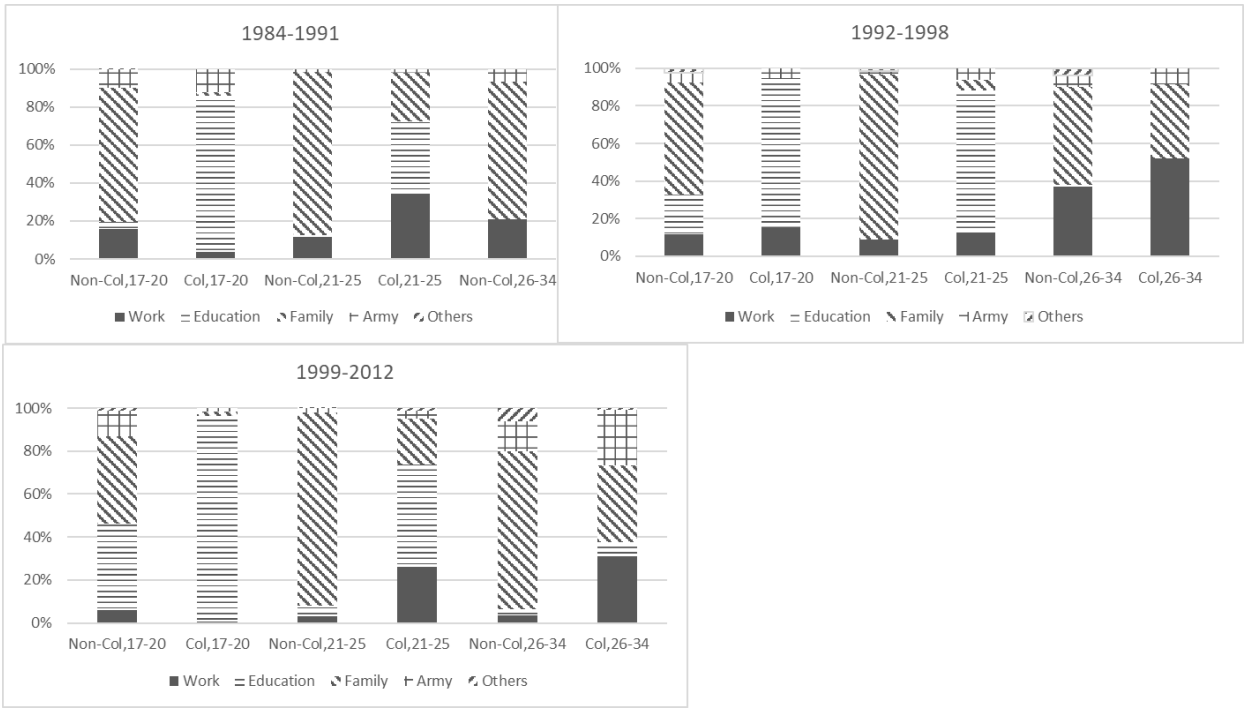
*This chart shows distribution of migration and Hukou change by education and by age group in 1984-1991, 1992-1998, 1999-2012. The y-axis denotes proportion of each migration reason among all migrants in an age group. From bottom to the top of each bar, the solid area denotes the percentage of people who did not migrate nor changed Hukou in each age range, the backslash area denotes the percentage of people who changed Hukou but did not migrate, the checked area denotes the percentage of people who migrated but did not change Hukou, and the slash area denotes the percentage of people who both migrated and changed Hukou.

Figure 7 Distribution of Regional Type of Hukou Change Destinations by Age Group and by Education



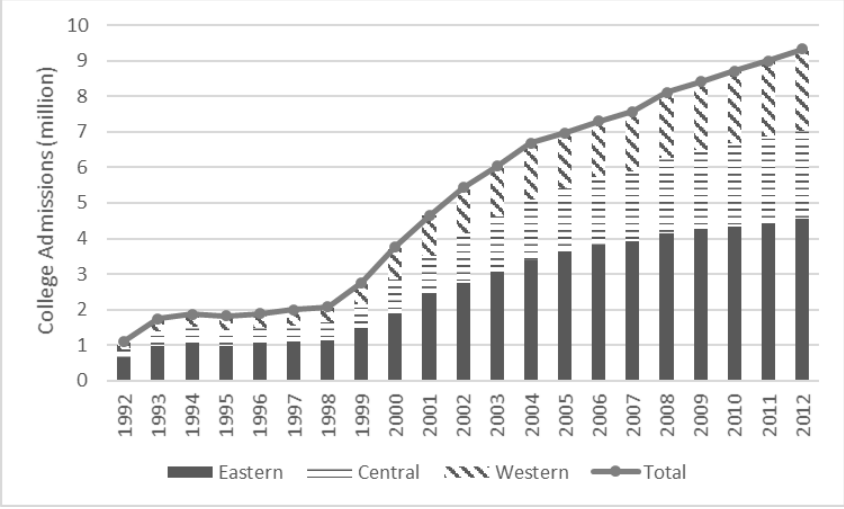
*This chart shows distribution of region type of Hukou change destination by education and by age group in 1984-1991, 1992-1998, 1999-2912. The y-axis denotes proportion of each region type among all Hukou change cases in an age group. From bottom to the top of each bar, the solid area denotes the township and below region, the area with horizontal lines denotes county level regions, the area with backslash denotes prefectural city, the area with check pattern denotes provincial capital, and area with slash denotes municipality. We use the Hukou change history data in the CLDS 2012 to calculate these proportions.

Figure 8 Distribution of Hukou Change Reason by Age Group and by Education



*This chart shows distribution of Hukou change reasons by education and by age group in 1984-1991, 1992-1998, 1999-2012. The y-axis denotes proportion of each Hukou change reason among all people who changed Hukou in an age group. From bottom to the top of each bar, the reasons can be summarized as for work, for receiving education, for family, for political reasons, and other reasons. We use the Hukou change history data in the CLDS 2012 to calculate these proportions.

Figure 9 Total Number and Regional Distribution of College Admissions by Year



*This chart shows the total number and the regional distribution of college admissions in China from 1992 to 2012. The y-axis denotes the number of college admissions (unit: 1 million), the solid black area in each bar denotes the proportion of college admissions in the eastern provinces, the hyphen area denotes the proportion in the central provinces, and the area with diagonal slashes denotes the proportion in the western provinces (Source: China Education Yearbook from 1996 to 2015).