Analysis of interregional migration in China in 2000-2005

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ABSTRACT

This paper conducts a comparative analysis of skilled and less-skilled migration in China, using the 2005 one percent population sample survey data. It is found that migration asymmetry existed among less-skilled migration in the period 2000-2005. The degree of migration asymmetry is less severe among skilled migrants than less-skilled migrants as the origins of less-skilled migration were much more concentrated than those of skilled migration. The top regions of relative attractiveness for skilled migration were similar to those of less-skilled migration. The relative emissiveness of skilled migration was less evenly distributed than that of less-skilled migration. Logistic models indicated that individuals who were younger, did not have children and elderly household members, and were engaged in non-agricultural work were more likely to migrate away from their original province than their counterparts, regardless of their skill levels. Less-skilled migrants tended to leave areas with a large population, a small non-agricultural sector, a high unemployment rate, and a small amount of foreign investment, while skilled migrants tended to migrate away from areas with a small population, an excessive supply of university graduates, a small non-agricultural sector, and a low wage level.

Keywords: Internal migration; Skilled migration; Less-skilled migration; Migration asymmetry; Logistic model; China

Introduction

Recent scholarship has highlighted the important role played by human capital accumulation in regional economic growth (Romer, 1990). A growing body of literature has examined the migration of skilled labor in western developed countries (Tang et al., 2014, Abreu et al., 2014). Most previous studies on migration patterns and determinants in China have focused on either general population or floating population (Shen, 2012. 2015, 2016, Fan, 2005, He and Pooler, 2002, Liang et al., 2014, Liu and Xu, 2015). It is only recently that the mobility and migration of skilled workers in China have received academic attention. Some studies have examined factors that affect skilled migration by using census and sample survey data of China (Fu and Gabriel, 2012). It is found that China's skilled people prioritise career prospects over amenity-related issues in their migration decisions (Liu and Shen, 2014a, 2014b). Some other studies on the mobility and migration trajectories of skilled people are based on questionnaire survey data collected at either the origins or the destinations (Cui et al., 2015).

Nevertheless, previous studies have rarely made a quantitative comparison between skilled and less-skilled migrants. Little is known about their differences in migration patterns, determinants, and decision-making processes. In order to fill this research gap, this paper aims to conduct a comparative analysis of skilled and less-skilled migration in China, using the 2005 one percent population sample survey data. Migration is a highly selective, uneven and asymmetric process. Some regions receive many migrants while some other regions loss many migrants under such process (Rogers and Sweeney, 1998, He and Pooler, 2002). Furthermore, migration asymmetry should be different between skilled migrants and less-skilled migrants. Thus migration asymmetry is one main focus of this paper. The paper will address following research questions. First, does migration asymmetry exist among both skilled and less-skilled migration? Is there any difference in the extent of asymmetry between two kinds of migration? Second, is the relative emissiveness of skilled migration more evenly distributed than that of less-skilled migration among origins? Are the top regions of relative attractiveness for skilled migration different from that of less-skilled migration? We particularly focus on how skilled migrants differ from less-skilled migrants in terms of demographic and socio-economic characteristics, migration patterns, and factors influencing migration propensity.

The paper is organized as follows. The next section introduces research data and methodology. This is followed by a comparison between skilled and less-skilled migrants in terms of demographic and socio-economic characteristics. The next section compares the migration patterns of skilled and less-skilled people. Then binary logistic regressions are used to estimate the effects of regional and individual factors on the migration propensity of skilled and less-skilled people. Some conclusions are reached in the final section.

Research data and methodology

Our analysis is based on the 2005 one percent population sample survey data (hereafter, 2005 Survey). We define migration as the change of usual place of residence within a five-year interval. A stayer is defined as a person whose usual place of residence is the same as five years ago. Skilled people are defined as those whose highest level of education is tertiary education, and less-skilled people are defined as those whose highest level of education is senior secondary education or below. Skilled migration and less-skilled migration refer to the migration of skilled and less-skilled people respectively. We include those who were aged 24-64 and economically active on the survey day, excluding retirees, students, homemakers, and the disabled. We set the lower age limit for all migrants to be 24 to ensure that both skilled migration and less-skilled migration are comparable in terms of age spans.

We focus on 30 province-level units (hereafter, provinces) in mainland China, excluding Tibet due to a very small number of skilled migrants moving to and away from Tibet (Fig. 1). We only analyze inter-provincial migration as information on intra-provincial migration is not available from the dataset. Our final dataset comprises 1,222,004 observations, including 4,658 skilled migrants, 96,280 skilled stayers, 44,034 less-skilled migrants, and 1,077,032 less-skilled stayers. The actual size of interprovincial migration flows is computed using the number of observed migrants and the province-specific sampling ratios. It is estimated that there were 1.62 million interprovincial skilled migrants and 17.36 million interprovincial less-skilled migrants in 2000-2005.

********** Insert Fig. 1 here **********

The method used by He and Pooler (2002) will be used to analyze the spatial patterns of migration. The coefficient of variation of out- and in-migration flows will be calculated for each province. Previous studies have shown that the migration scale in China has increased and the temporary labor migrants still dominate the interregional migration in China (Sun and Fan 2011). He and Pooler (2002) found regional concentration (asymmetry) of interprovincial migration flows in China. However, the origins of skilled migrants are different from less-skilled migrants as less-skilled migrants mainly come from a few origins (Shen, 2015). In other words, migration asymmetry is less likely to occur among skilled migrants than less-skilled migrants. Thus the following two hypotheses can be tested in this stage:

H1: Migration asymmetry exists among less-skilled migration in the period 2000-2005.

H2: The degree of migration asymmetry is less severe among skilled migrants than less-skilled migrants.

The approach of spatial migration structure will be used for a more detailed analysis of spatial patterns of migration (Rogers et al., 2002). The relative emissiveness and relative attractiveness for various regions can be calculated for skilled and less-skilled migration respectively. Location quotients can be calculated to reveal regions with stronger or weaker emissiveness and attractiveness in skilled migration versus less-skilled migration.

Following the previous reasoning, the less-skilled migration mainly originates from a few regions while the origins of skilled migration may be more diversified. The skilled and less-skilled migration will move to different destinations. This will also be reflected in different location quotients of skilled and less-skilled migration. Thus we can set up the following hypotheses:

H3: The top regions of relative attractiveness for skilled migration should be different from those of less-skilled migration.

H4: The relative emissiveness of skilled migration (location quotients) should be more evenly distributed than that of less-skilled migration.

Finally, binary logistic regressions are used to estimate the effects of regional and individual factors on the migration propensity of skilled and less-skilled people. Such analyses will be useful to explain the existence of asymmetric migration.

The demographic and socio-economic characteristics of skilled and less-skilled people

Table 1 presents the summary statistics of skilled migrants, skilled stayers, less-skilled migrants, and less-skilled stayers. We firstly compare skilled migrants with less-skilled migrants. On average, skilled migrants were younger than less-skilled migrants. Nearly 60% of skilled migrants were aged 24-29 and they migrated within a few years after graduation (most Chinese people obtain their bachelor's degree or college diploma at the age of 21-23). Chinese government started to expand the higher education system in 1998, resulting in a surge of university graduates in the subsequent years (Levin and Xu, 2005).

Less-skilled migrants had a more balanced gender composition than skilled migrants, because many female migrants work in manufacturing and service sectors in the coastal region. But skilled migrants showed a lower percentage of being married and having children. This is because skilled migrants were younger than less-skilled migrants on average. Furthermore, many couples in the countryside migrated to the city for employment either with or without their children (Fan, 2011). Both skilled and less-skilled migrants had a similar percentage of having elderly family members in the household.

********** Insert Table 1 here **********

With respective to the socioeconomic status, skilled migrants on average had more prestigious and higher-paid jobs than less-skilled migrants. Nearly half of skilled migrants had a managerial or professional occupation, while more than 80% of less-skilled migrants were employed as commercial/industrial workers. Skilled migrants

(29.04%) were more likely than less-skilled migrants (6.27%) to be employed in the state sectors, including government and public organizations, and state-owned enterprises, while less-skilled migrants (25.79%) were more likely than skilled migrants (6.86%) to be individual business owners or self-employers. This suggests that the migration of skilled people was more determined by the state sector. Skilled migrants on average earned higher wages than less-skilled migrants. More than 90% of less-skilled migrants earned less than 1,000 *yuan* per month, while nearly 80% of skilled migrants earned more than 1,000 *yuan* per month.

In addition, there was a larger share of skilled migrants holding local *hukou* and non-agricultural *hukou* than less-skilled migrants. Skilled migrants had more chances than less-skilled migrants to get local *hukou* status at the host city. Indeed, most *hukou* places were allocated to skilled migrants who were supposed to contribute more to the economic growth and fiscal revenue of the host city than less-skilled migrants (Sun and Fan, 2011, Zhang, 2010).

We also compare migrants and stayers at the same skill level. Overall, the migration of both skilled and less-skilled people was a selective process. Migrants were on average younger than stayers, and the former group was more represented than the latter group in male, unmarried, and childless cohorts. Migrants also on average earned higher monthly wages than stayers.

Migration patterns of skilled and less-skilled people

Largest flows and migration efficiency

Table 2 shows the top ten provinces of in-migration, out-migration, and net migration. Both skilled migrants and less-skilled migrants tended to move from the central and western regions to the eastern region. With regard to skilled migration, eight out of ten largest recipients were located in the eastern region. The top five recipients, Guangdong, Shanghai, Beijing, Jiangsu and Zhejiang, absorbed 40.53% of skilled migrants as skill-intensive and knowledge-based industries were highly concentrated in these areas (Yang and Yeh, 2013). Four provinces, Guangdong, Shanghai, Beijing and Zhejiang, had a substantial net gain of skilled migrants (over 10 thousands).

********** Insert Table 2 here **********

Seven out of ten largest exporters of skilled migrants were located in the central and western regions. They generally had a large number of university graduates each year, but they were not able to retain them due to insufficient skilled job opportunities and relatively low wages. The largest exporters of skilled migrants were also the biggest losers in the brain competition. The only two exceptions were Jiangsu and Guangdong, with a net gain of skilled labor.

As for less-skilled migration, eight out of ten largest recipients were located in the eastern region, and the top five recipients accounted for 39.42% of less-skilled migrants. Guangdong, Zhejiang, Jiangsu and Fujian were among the largest five recipients of less-skilled migrants. Their export-oriented manufacturing industries absorbed many cheap rural migrants. Shanghai and Beijing also attracted considerable less-skilled labor with expanding service and construction sectors. Eight out of the top ten provinces were also among the top ten net gainers of less-skilled people. Only one western province, Xinjiang, was among the top ten net gainers of less-skilled migrants due to rapid economic growth (Liu et al., 2014).

Eight out of ten largest donors of less-skilled migrants were located in the central and western regions. They had a large rural population but limited employment opportunities. Guangdong and Jiangsu were also the major places of origins for less-skilled migration due to return migration (Liang et al., 2014). The ten largest net losses of less-skilled people were in central and western provinces.

Migration efficiency is the ratio of net migration to total in-migration and out-migration (Stillwell et al., 2000). All eastern provinces except Liaoning, Hebei, and Tianjin had a positive efficiency score of skilled migration, and Guangdong, Shanghai, Beijing and Zhejiang had the highest migration efficiency. In contrast, all central provinces and western provinces except Qinghai and Guizhou exhibited a net loss of skilled people, and most provinces in the central region along with Shanxi had a efficiency score of skilled migration below -60.00%.

Nearly all eastern provinces had a positive efficiency score of less-skilled migration, and Beijing, Tianjin, Shanghai and Zhejiang had the highest efficiency score (over 60.00%). Tianjin and Liaoning, with a net loss of skilled migrants, had a net gain of less-skilled migrants. All provinces in the central region and most provinces in the western region had a negative efficiency score of less-skilled migration. However, Xinjiang, Qinghai, Inner Mongolia and Ningxia in northwest China exhibited a positive efficiency score.

Fig. 2a illustrates the 30 largest skilled migration flows, which accounted for 38.88% of the total skilled migrants. Guangdong, Shanghai and Beijing were the most prominent destinations. Jiangsu and Zhejiang drew numerous skilled migrants from nearby provinces but provided considerable skilled labor to Shanghai. Many provinces located in Northeast China, North China, Central China and Southwest China were primary donors of skilled labor. Provinces with a large higher education enrollment and a poor ability to absorb university graduates experienced a massive outflow of skilled migrants. In addition, the friction of distance mattered in skilled migrants' choices of destination, leading to the emergence of three clusters of prominent migration streams: the North-Northeast China centered on Beijing, the East China centered on Shanghai and the South Central-Southwest China centered on Guangdong.

********** Insert Fig. 2 here **********

Fig. 2b maps the 30 largest less-skilled migration flows, which account for 52.48% of the total less-skilled migrants. Less-skilled migrants were more concentrated in the southeast coastal provinces of China. More than 20 largest less-skilled migration flows were toward China's labor-intensive manufacturing belt straddling four southeast coastal provinces, Guangdong, Zhejiang, Jiangsu and Fujian. Beijing and Shanghai were also the destinations of some prominent less-skilled migration flows. Provinces located in central China and Southwest China were major migrant-sending provinces. It is noteworthy that several prominent migration streams toward Guangdong were accompanied by large counter-streams (e.g. Guangxi-Guangdong, Sichuan-Guangdong and Hunan-Guangdong). Many rural migrant workers returned to their hometowns as a result of the growth of

investment in inland and rural areas and the depression of labor-intensive industries in the southeast coast (Liang et al., 2014, Zhu and Chen, 2010).

Measuring the spatial concentration of migration flows

We used the coefficient of variation (CV) to gauge the degree of spatial concentration of migration flows (Rogers and Sweeney, 1998). A larger CV indicates that the distribution of migration flows is more geographically concentrated, and a smaller CV indicates that the distribution is more even geographically. An average CV (ACV) index for out-migration (or in-migration) is derived from a weighted summation of provincial out-migration CVs (or in-migration CVs), and each province's share of out-migrants (or in-migrants) for in the total number of migrants is used as the weight. A system-wide ACV is computed by summing ACV indices for in-migration and out-migration (Rogers and Sweeney, 1998, He and Pooler, 2002).

Asymmetry between out- and in-migration flows existed for both skilled and less-skilled people, and the destinations of skilled and less-skilled migration flows (ACVs for out-migration flows are 2.01 and 2.11, respectively) were more spatially concentrated than the corresponding origins (ACVs for in-migration flows were 1.16 and 1.68, respectively). This is consistent with the results of Table 2 that the top five destinations accounted for 68.15% and 65.07% of total skilled migrants and less-skilled migrants. The first hypothesis H1 is confirmed that migration asymmetry existed among less-skilled migration in the period 2000-2005. The asymmetry of skilled in-migration flows was less severe with a small ACV of 1.16 and their origins were more evenly distributed than that of less-skilled migration.

The second hypothesis H2 is confirmed that the degree of migration asymmetry is less severe among skilled migrants than less-skilled migrants. This is because the origins of less-skilled migration were much more concentrated than those of skilled migration. This is also supported by the results of Table 2 that the top five migration donors accounted for 33.83% and 46.58% of total skilled migrants and less-skilled migrants, respectively. But the ACVs of skilled and less-skilled out-migration flows were close. Overall the system-wide ACV of less-skilled migrants (3.17) was greater than that of

skilled migrants (3.78) mainly because the origins of less-skilled migrants were more concentrated.

Decomposition of migration factors

Rogers et al (2002) suggested that the log-linear specification of spatial interaction model can be used to describe the migration spatial structure of migration flows, M_{ij}, in a spatial system as follows:

$$M_{ij} = KP_iQ_jF_{ij} \quad (1)$$

Here i is the subscript referring to an origin and that j is the subscript referring to a destination. The K parameter represents the overall effect and is equal to the geometric mean value of all flows in a migration matrix under effect coding scheme. The relative emissiveness P_i and attractiveness Q_j are the ratios of the geometric mean of row i and column j to K respectively. F_{ij} describes the spatial interaction effect, not accounted for by the overall effect and the row and column effects (effects of origins and destinations). It can be calculated once other factors are calculated using the following equation.

$$F_{ij} = M_{ij} / KP_iQ_j \quad (2)$$

Other coding schemes will estimate different but consistent sets of effects. Thus regional migration can be decomposed into above four factors. These migration factors show the constant, regional attractiveness, regional emissiveness and spatial interaction effect separately.

The above approach is used to decompose skilled and less-skilled migration in China. According to table 3, less-skilled migration had a much larger constant effect than skilled migration, given large scale less-skilled migration in China. But the skilled migration had much larger mean effects of relative attractiveness and spatial interaction

than less-skilled migration as skilled migration was more selective and less constrained by spatial barriers.

********** Insert Table 3 here **********

Shanghai, Jiangsu, Zhejiang and Guangdong had high relative attractiveness over ten for both skilled migration and less-skilled migration. This means that the same regions were attractive to both skilled and less-skilled migrants. In addition, Beijing and Tianjin also had high relative attractiveness. The third hypothesis H3 is rejected and that the top regions of relative attractiveness for skilled migration were similar to those of less-skilled migration.

But the regions with high relative emissiveness over ten were different for skilled migration and less-skilled migration, indicating different origins of skilled and less-skilled migrants. For skilled migration, Beijing and Guangdong had high relative emissiveness over ten, reflecting return migration as they also had high relative attractiveness. For less-skilled migration, Henan and Sichuan had high relative emissiveness. The CV of relative emissiveness of skilled migration (1.84) is greater than that of less-skilled migration (1.21). The fourth hypothesis H4 is rejected and that the relative emissiveness of skilled migration (location quotients) was less evenly distributed than that of less-skilled migration. As Beijing and Guangdong were the magnet of skilled migrants, they were also important source of skilled migrants. Guangdong was among the top ten origins of skilled migrants (67715) and Beijing had similar number of skilled migrants (66945) leaving the city in the period 2000-2005. Skilled migrants from Beijing and Guangdong went to almost every province so they had very high relative emissiveness. Hubei had the largest number of 142957 skilled migrants leaving but there were no migrants who went to seven provinces, reducing its relative emissiveness.

Location quotients are also calculated to show the relative strength of skilled migration over less-skilled migration. Beijing, Shanghai and Guangdong had high location quotients over one for relative attractiveness and emissiveness indicating that these regions were major hubs of skilled migrants with large inflows and outflows. In addition, Tianjin, Liaoning, Jilin, Heilongjiang, Jiangsu, Shaanxi, Gansu and Ningxia had

high location quotients over one for relative emissiveness indicating that these regions sent out more skilled migrants relative to less-skilled migrants.

A comparison of the propensity to migrate between skilled and less-skilled people

We conduct binary logistic regressions separately for skilled people and less-skilled people to evaluate their differences in propensity to migrate. We assume that each person must make choices between two alternatives (migrate away from the original province or stay in the original province), and that his/her decision about whether or not to migrate is a function of a range of individual and regional factors (Thomas et al., 2015). In the regressions, the dependent variable is coded 1 for migrants and 0 for stayers. Independent variables include individual-level variables related to the age, gender, household structure, and occupation and province-level variables related to the demographic, educational, and economic characteristics of the original province (Table 4). We carry out a Variance Inflation Factor (VIF) test and find no evidence of multi-collinearity among independent variables.

********** Insert Table 4 here **********

Models 1 and 3 describe the propensity to migrate for skilled and less-skilled people respectively using only the individual-level variables. Results of these two models show that, for both skilled and less-skilled people, individuals who were younger, did not have children and elderly household members, and were engaged in non-agricultural work were more likely to migrate than their counterparts (Table 5). With regard to age (with 'aged 30-39' as the reference category), skilled people who were aged 24-29 were 1.89 times, 4.61 times, and 6.10 times more likely to leave their original province than those who were aged 30-39, aged 40-49, and aged 50-64, respectively. Similarly, less-skilled people who were aged 24-29 are 1.44 times, 4.97 times, and 9.00 times more likely to migrate away from their original province than those who were aged 30-39, aged 40-49, and aged 50-64, respectively. Having one or more children under 16 in the household decreased the odds of leaving their original province by about 71% for skilled people and about 76% for less-skilled people. Having one or more elderly household members over 70 in the household decreased the odds of leaving their original province

by about 76% for skilled people and about 66% for less-skilled people. This reflects the fact that many working-aged people, in particular female working-aged people, had to stay in the original province to take care of their small children and elderly. As for occupation (with 'agriculture' as the reference category), skilled people whose main occupation was not agriculture were between 1.53 and 3.94 times more likely to migrate than those whose main occupation was agriculture. Less-skilled people whose main occupation was not agriculture were between 1.98 and 12.99 times more likely to leave the original province than those whose main occupation was agriculture.

********** Insert Table 5 here **********

The results of Model 1 for skilled people differ from the results of Model 3 for less-skilled people in several aspects. First, male skilled people were 1.49 times more likely to migrate than their female counterparts, but the propensity of less-skilled people to migrate did not differ significantly by gender. This is consistent with the fact that millions of female workers left their rural hometown and worked in manufacturing and service sectors in the coastal region. Second, skilled people who were married were less likely to migrate while less-skilled people who were married were more likely to migrate. Third, skilled people who were commercial workers and managers had the highest probability to migrate among all occupational groups, while less-skilled people were more migratory if they were industrial and commercial workers instead of other occupational groups.

Models 2 and 4 include not only the variables of individual characteristics but also the variables of provincial attributes for skilled and less-skilled people respectively. The coefficients of individual variables in Models 1 and 2 (in Models 3 and 4 as well) are largely the same in terms of coefficient signs and significant levels. We focus on the coefficients of province-level variables here. With regard to the total population of original province (POP), less-skilled individuals had a higher probability to leave their original province in more populous areas, and a one-percent increase in the total population caused an increase in the odds for less-skilled people to leave their original province by 1.96 times. However, skilled individuals tended to have a higher probability to leave their original province in less-populous areas than in more-populous areas,

because population agglomeration was correlated with urban amenities, which were attractive to skilled people (Glaeser and Gottlieb, 2006).

The number of university graduates (UNIGRAD) had a positive effect on the out-migration of skilled people, and a one-percent increase in the number of university graduates increased the odds of skilled people moving away from their province of residence by 97%. This is consistent with our previous findings that the massive outflows of less-skilled people tended to occur in populous provinces, and that those of skilled people tended to happen in provinces that supplied a large number of university graduates to the labor market. The share of labor in the agricultural sector (AGRIL) had a stronger effect on the migration propensity of less-skilled people than that of skilled people, because the majority of less-skilled migrants were actually rural migrant workers from the countryside. Skilled people would also leave provinces with a high share of labor in the agricultural sector. Specifically, a one-percent increase in the proportion of agricultural employment led to an increase in the odds of less-skilled people and skilled people moving away from their original domicile by 2% and 1%, respectively.

With regard to the economic conditions of the original province, skilled people were less likely to migrate away from regions with a high urban wage level (URBWAGE). A one-percent increase in the average annual wage in the city of original province decreased the odds of skilled people leaving the province by 75%. However, less-skilled people were less sensitive than skilled people to the urban wage level of original province in making migration decisions. The migration propensity of less-skilled people was positively correlated with the urban wage level. The urban unemployment rate (URBUNEMP) in the original province had a positive effect on the probability for less-skilled individuals to leave their original province but had no significant impact on the migration propensity of skilled individuals. Specifically, a one-percent increase in the urban unemployment rate led to an increase in the odds for less-skilled people to leave their original province by 10%. The above findings confirm Arntz (2010)'s argument that the job moves of highly skilled individuals are mainly driven by interregional income differentials, and that those of less-skilled individuals are mainly determined by interregional differentials in job opportunities. Foreign investment had a negative impact

on the migration propensity of less-skilled individuals, and a one-percent increase in the ratio of foreign direct investment to GDP (FDIGDP) in the original province caused a decrease in the odds for less-skilled people to move away from their original province by 6%. Less-skilled individuals were more sensitive to the inflows of foreign investment than skilled individuals, because foreign investment generated considerable demand for cheap labor in labor-intensive industries (Fan, 1996). Therefore, a larger inflow of foreign investment represents more employment opportunities for less-skilled labor.

Conclusion

Migration plays an important role in China's urbanization and urban development. It is expected that skilled and less-skilled migrants are different. This paper conducts a comparative analysis of skilled and less-skilled migration in China, using the 2005 one percent population sample survey data. It is found that skilled migrants on average had more prestigious and higher-paid jobs than less-skilled migrants. This is consistent with the human capital theory (Romer, 1990). The government should pay great attention to education and the supportive policies of skilled migrants to develop knowledge based economy.

Four hypotheses are tested about the spatial patterns of migration. The first hypothesis H1 is confirmed that migration asymmetry existed among less-skilled migration in the period 2000-2005. This is similar to the previous findings on general migration in USA and China (Rogers and Sweeney, 1998, He and Pooler, 2002). The second hypothesis H2 is confirmed that the degree of migration asymmetry is less severe among skilled migrants than less-skilled migrants. This is because the origins of less-skilled migration were much more concentrated than those of skilled migration. This is also supported by the fact that the top five migration donors accounted for 33.83% and 46.58% of total skilled migrants and less-skilled migrants, respectively.

Shanghai, Jiangsu, Zhejiang and Guangdong had high relative attractiveness over ten for both skilled migration and less-skilled migration. This means that the same regions were attractive to both skilled and less-skilled migrants. The third hypothesis H3

is thus rejected. The fourth hypothesis H4 is rejected and that the relative emissiveness of skilled migration (location quotients) was less evenly distributed than that of less-skilled migration. As Beijing and Guangdong were the magnet of skilled migrants, they were also important source of skilled migrants. Guangdong was among the top ten origins of skilled migrants (67715) and Beijing had similar number of skilled migrants (66945) leaving the city in the period 2000-2005. This paper's analyses revealed that the migration hub is attractive to both skilled migration and less-skilled migration and that the migration hub of skilled migration is also an important origin of skilled migration. They are consistent with previous studies on the destination of general migration and return migration (Shen, 2012; 2015, Fan, 2005, Liang et al., 2014). The circulation of skilled migrants in major migration hubs should be facilitated.

Results from logistic models have indicated that the differences between migrants and stayers in personal characteristics were largely similar for both skilled and less-skilled individuals, and regional factors affecting migration propensity differed greatly between skilled and less-skilled people. Specifically, individuals who were younger, did not have children and elderly household members, and were engaged in non-agricultural work were more likely to migrate away from their original province than their counterparts, regardless of their skill levels. Less-skilled migrants tended to leave areas with a large population, a small non-agricultural sector, a high unemployment rate, and a small amount of foreign investment, while skilled migrants tended to migrate away from areas with a small population, an excessive supply of university graduates, a small non-agricultural sector, and a low wage level. These findings go beyond the general migration studied in previous studies (Shen, 2012; 2015, Fan, 2005) and provide new insights of skilled and less-skilled migration (Liu and Shen, 2014a, 2014b).

The major destinations of skilled migration are expected to differ from those of less-skilled migration in the future, because there is a divergence between the distribution of skill-intensive industries and that of labor-intensive industries. Skilled people will continue to be highly concentrated in major metropolitan cities such as Beijing and Shanghai which provide competitive salaries and high-quality public goods and services (Liu and Shen, 2014a; 2014b). Less-skilled workers, especially those from the central and

western regions, may find jobs in their home provinces, as many labor-intensive manufacturing industries may be developed in the inland regions. Thus new patterns of migration may emerge in China and call for new migration policies.

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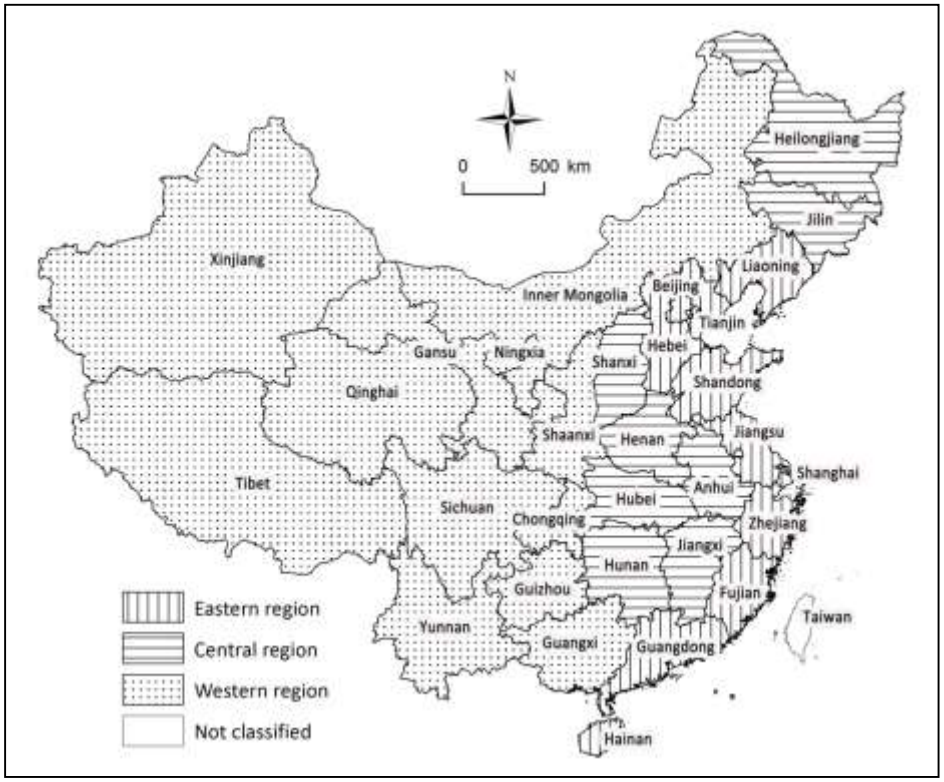
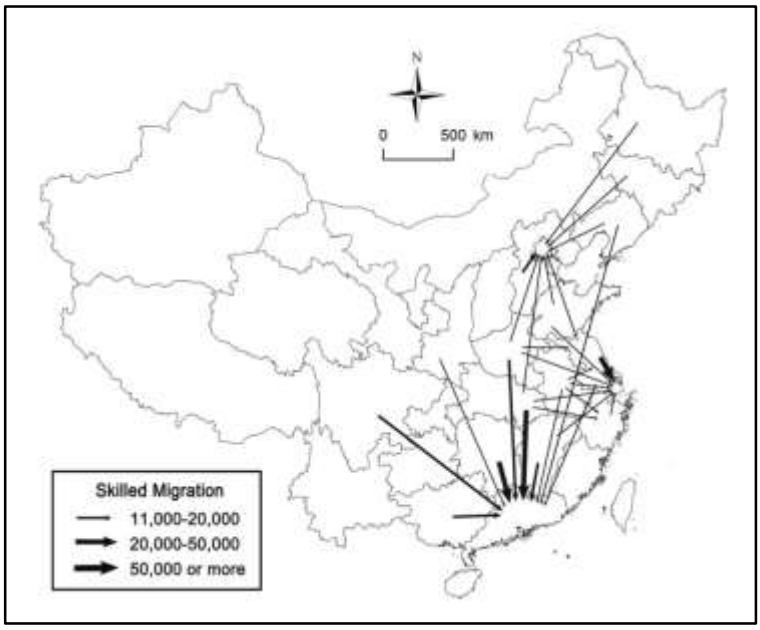
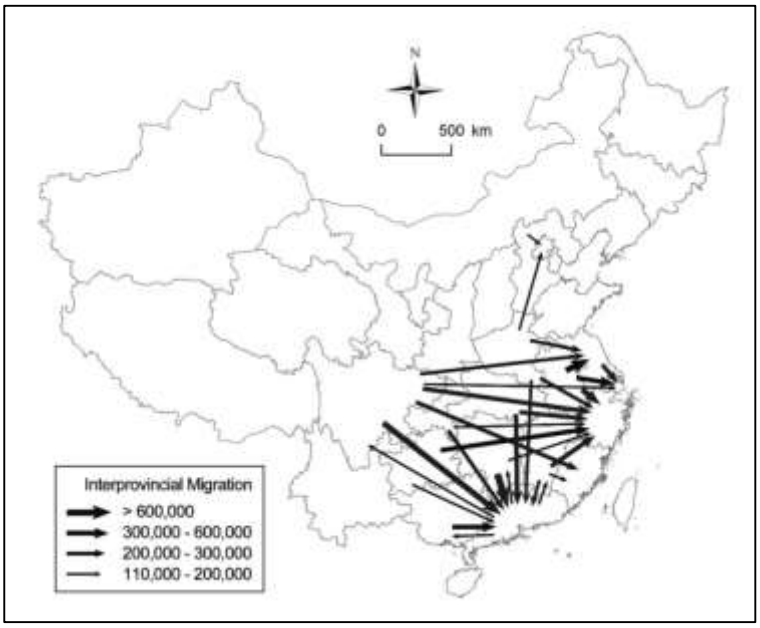


Fig. 1 The provinces and regions of China



a. Skilled migration



b. Less-skilled migration

Fig. 2 The 30 largest flows of migration, 2000-2005

Table 1 Summary statistics of skilled and less-skilled people

	Less-skilled migrants	Less-skilled stayers	Skilled migrants	Skilled stayers
Age (%)				
24 - 29	33.82	13.14	59.30	23.65
30 - 39	45.67	33.88	28.79	41.89
40 - 49	15.49	29.80	8.54	24.97
50 - 64	5.02	23.18	3.37	9.49
Gender (%)				
Female	41.18	45.64	35.51	41.60
Male	58.82	54.36	64.49	58.40
Marital status (%)				
Single	14.21	5.36	44.68	12.62
Married	84.66	91.28	54.25	85.44
Divorced	0.82	1.32	0.94	1.61
Widowed	0.31	2.04	0.13	0.33
The presence of children under 16 in the household (%)				
Yes	24.35	54.11	14.68	44.80
No	75.65	45.89	85.32	55.20
The presence of elderly family members over 70 in the household (%)				
Yes	1.86	8.45	0.97	4.92
No	98.14	91.55	99.03	95.08
Occupation (%)				
Manager	1.55	1.19	9.83	8.66
Professional	2.26	4.90	37.61	45.45
Clerk	3.19	2.49	15.18	23.29
Commerce	27.01	11.79	22.58	10.27
Agriculture	7.87	59.25	0.52	1.37
Industrial	55.61	16.36	11.03	7.46
Unemployed	2.51	4.02	3.25	3.51
Place of hukou registration (%)				
Local	8.41	95.84	19.00	95.50
Non-local	91.59	4.16	81.00	4.50
Hukou type (%)				
Non-agricultural	11.90	21.51	86.07	96.06
Agricultural	88.10	78.49	13.93	3.94

Source: tabulated by the authors.

Table 2 Provinces with the largest in-migration, out-migration and net migration, 2000-2005 (in thousand)

Skilled migrants				Less-skilled migrants			
Province	No.	Province	No.	Province	Index	Province	No.
In-migration		Out-migration		In-migration		Out-migration	
Guangdong	393	Hubei	143	Guangdong	4,009	Sichuan	2,140
Shanghai	243	Hunan	117	Zhejiang	2,942	Anhui	2,127
Beijing	235	Jiangsu	116	Jiangsu	1,789	Henan	1,393
Jiangsu	117	Henan	91	Shanghai	1,540	Hunan	1,293
Zhejiang	114	Anhui	80	Fujian	1,015	Guangdong	1,133
Shandong	67	Heilongjiang	78	Beijing	843	Hubei	1,057
Fujian	40	Sichuan	73	Shandong	469	Jiangxi	1,016
Sichuan	39	Jiangxi	71	Sichuan	438	Guizhou	810
Liaoning	34	Liaoning	68	Anhui	427	Chongqing	764
Hebei	31	Guangdong	68	Tianjin	391	Jiangsu	704
Net gains		Net losses		Net gains		Net losses	
Guangdong	325	Sichuan	-34	Guangdong	2,876	Heilongjiang	-387
Shanghai	206	Liaoning	-34	Zhejiang	2,322	Guangxi	-460
Beijing	168	Jiangxi	-49	Shanghai	1,283	Guizhou	-480
Zhejiang	73	Shaanxi	-53	Jiangsu	1,085	Chongqing	-550
Fujian	7	Jilin	-60	Beijing	693	Jiangxi	-730
Guizhou	4	Anhui	-62	Fujian	635	Hubei	-817
Hainan	2	Heilongjiang	-68	Tianjin	358	Hunan	-996
Qinghai	2	Henan	-75	Xinjiang	215	Henan	-1,259
Shandong	1	Hunan	-97	Liaoning	160	Anhui	-1,701
Jiangsu	1	Hubei	-125	Shandong	64	Sichuan	-1,702

Source: tabulated by the authors.

Table 3 Comparing migration factors of skilled and unskilled migration, 2000-2005

Mean Parameters	Less-skilled migration	Skilled migration	Ratio
Overall effect K	1127.14	29.28	38.49
Relative emissiveness P_i	3.27	3.82	0.86
Relative attractiveness Q_j	4.01	23.06	0.17
Interaction between region i & j F_{ij}	27.67	67.01	0.41

Source: calculated by the authors.

Table 4 Independent variables in the binary logistic regression

Variable	Description
	Individual characteristics
Age2429	= 1 if aged 24-29
Age4049	= 1 if aged 40-49
Age5064	= 1 if aged 50-64
Male	= 1 if male
Married	= 1 if married
Child16	= 1 the presence of children under 16 in the household
Elderly70	= 1 the presence of elderly household members over 70
Manager	= 1 if in a managerial occupation
Professional	= 1 if in a professional occupation
Clerk	= 1 if in a clerical occupation
Commerce	= 1 if in a commercial occupation
Industrial	= 1 if in an industrial occupation
Unemployed	= 1 if unemployed
	Province-level characteristics
POP	Total population in 2000, million (in log) [a]
UNIGRAD	Number of university graduates in 2000, person (in log) [b]
AGRIL	The share of labor in the agricultural sector, % [a]
URBWAGE	Average annual wage in the city in 2000, yuan (in log) [b]
URBUNEMP	Urban unemployment rate in 2000, % [a]
FDIGDP	Ratio of foreign direct investment (FDI) to GDP in 2000, yuan/yuan [b]

Sources: a. 2000 Population Census of China; b. China Statistical Yearbook 2001

Table 5 Binary logistic regression results predicting the propensity to migrate, 2000-2005

	Model 1 (Skilled People)			Model 2 (Skilled People)			Model 3 (Less-skilled People)			Model 4 (Less-skilled People)		
	Estimates	t values	Odds ratios	Estimates	t values	Odds ratios	Estimates	t values	Odds ratios	Estimates	t values	Odds ratios
Individual characteristics												
Age2429	0.635***	(14.23)	1.89	0.615***	(13.59)	1.85	0.364***	(24.78)	1.44	0.375***	(25.29)	1.45
Age4049	-0.901***	(-13.21)	0.41	-0.958***	(-13.91)	0.38	-1.232***	(-69.18)	0.29	-1.185***	(-66.22)	0.31
Age5064	-1.174***	(-11.47)	0.31	-1.221***	(-11.82)	0.29	-1.861***	(-65.84)	0.16	-1.819***	(-64.04)	0.16
Male	0.397***	(10.34)	1.49	0.397***	(10.26)	1.49	0.014	(1.08)	1.01	-0.017	(-1.33)	0.98
Married	-0.607***	(-13.90)	0.54	-0.676***	(-15.11)	0.51	0.275***	(14.69)	1.32	0.279***	(14.72)	1.32
Child16	-1.231***	(-23.37)	0.29	-1.253***	(-23.50)	0.29	-1.411***	(-97.25)	0.24	-1.434***	(-97.12)	0.24
Elderly70	-1.433***	(-8.06)	0.24	-1.382***	(-7.73)	0.25	-1.076***	(-25.87)	0.34	-1.055***	(-25.05)	0.35
Manager	1.218***	(4.91)	3.38	1.370***	(5.45)	3.94	1.714***	(34.36)	5.55	1.992***	(38.53)	7.33
Professional	0.639***	(2.63)	1.89	0.730***	(2.97)	2.08	0.685***	(16.33)	1.98	0.746***	(17.56)	2.11
Clerk	0.428*	(1.74)	1.53	0.528**	(2.13)	1.70	1.550***	(42.46)	4.71	1.773***	(46.94)	5.89
Commercial	1.372***	(5.62)	3.94	1.465***	(5.93)	4.33	2.131***	(97.25)	8.42	2.343***	(100.78)	10.41
Industrial	1.048***	(4.24)	2.85	1.108***	(4.43)	3.03	2.564***	(125.07)	12.99	2.810***	(124.47)	16.61
Unemployed	0.918***	(3.51)	2.50	1.001***	(3.78)	2.72	1.169***	(29.15)	3.22	1.395***	(33.94)	4.03
Province-level characteristics												
POP				-0.560***	(-7.34)	0.57				1.086***	(28.86)	2.96
UNIGRAD				0.679***	(10.38)	1.97				-0.835***	(-27.42)	0.43
AGRIL				0.006**	(1.98)	1.01				0.023***	(24.42)	1.02
URBWAGE				-1.373***	(-6.33)	0.25				1.204***	(17.19)	3.33
URBUNEMP				0.006	(0.84)	1.01				0.094***	(33.75)	1.10
FDIGDP				-0.002	(-0.15)	1.00				-0.057***	(-12.50)	0.94
Intercept	-3.564***	(-14.44)		11.175***	(4.75)		-4.135***	(-157.97)		-27.805***	(-35.93)	
Pseudo R^2	0.132			0.144			0.225			0.248		
Log pseudo-likelihood	-6096371			-6006674			-60520398			-58647727		
N	100938			100938			1121066			1121066		

Notes: ***, **, * denote statistical significance at 1%, 5%, and 10% level, respectively. Sampling weights and robust variance estimators were used.
Source: calculated by the authors.