Market Demand of Migration and Floating Migration: Using Micro Data of the Chinese Household Income Project

Yang Liang※ and Suminori Tokunaga
Graduate School of Life and Environmental Sciences, University of Tsukuba

1. Introduction

One of the most prominent characteristics of the Chinese economic development during the last 30 years has been the farmers' mobility from rural to urban areas. Farmers' mobility includes two categories (Liang and Tokunaga [8]): 1) Migration (a permanent mobility, which is used for a farmer who moves from hometown to other areas and changes the hukou[1)]); 2) Floating migration (a temporary mobility and the hukou remains unchanged). The National Central Economic Conference in 2009 issued that easing of *hukou* restrictions in medium and small cities and towns was one of the government's intentions in 2010.

Previous studies have estimated the determinants of mobility in terms of the supply of laborer, such as the individual, household and home region characteristics and so on (Borjas [1], Chiquiar and Hanson [2], Laszlo and Santor [7], Munshi [9] and Wu [13]). However, it is greatly necessary to consider the demand of laborer based on the factors of market economy. Initiated by Fujita et al. [4] and Krugman [6], New Economic Geography theory analyzes the spatial location of economic activity. Although a great deal of empirical literatures has followed this theory, the new economic geography has not yet generated an empirical analysis on Chinese farmers' mobility for finding a job in the city. The Population Census database used in previous studies refers to individuals' movement not only for employment in the city, but also for marriage, education and visiting the relatives. This paper aims to study the determinants of migration and floating migration form rural to urban areas based on the factors of market demand of laborers and to focus on the access to market and distance between the origin to the destination.

2. Migration and floating migration based on the micro data

Table 1. Characteristics of migration and floating migration

		Migration			Floating migration	
		Persons	%		Persons	%
Observations		101	3.40		2889	96.60
Destinations	Code in CHIP	Province	%	Code in CHIP	Province	%
	11	Beijing	13.9	11	Beijing	4.7
	14	Shanxi	7.9	14	Shanxi	6.0
	21	Liaoning	14.9	21	Liaoning	11.2
	32	Jiangsu	14.9	32	Jiangsu	9.5
	34	Anhui	6.9	34	Anhui	10.3
	41	Henan	7.9	41	Henan	9.3
	42	Hubei	2.0	42	Hubei	10.0
	44	Guangdong	16.8	44	Guangdong	10.4
	50	Chongqing	3.0	50	Chongqing	4.8
	51	Sichuan	3.0	51	Sichuan	7.6
	53	Yunnan	4.0	53	Yunnan	8.4
	62	Gansu	5.0	62	Gansu	7.7
Education			%			%
	University and above		6.94	University and above		0.31
	Junior college		10.89	Junior college		1.32
	Vocational school		10.89	Vocational school		3.29
	Senior high school		25.74	Senior high school		11.6
	Junior high school		33.66	Junior high school		49.01
	Elementary school		7.92	Elementary school		23.64
	Less than elementary school		3.96	Less than elementary school		10.83

Source: the authors' calculation based on the CHIP database [5].

The Chinese Household Income Project [5] summarized the survey in urban areas and focused on farmers who have moved from rural to urban areas with standard demographic variables (including the *hukou* categories) as well as economic variables such as medical insurance, expenditures and employment information. Due to incomplete information and false results, 2990 valid individual questionnaires were chosen from the CHIP database. They come from rural areas in most of provinces of China (except Hainan, Tibet and Xinjiang Provinces) and move to the city of 12 provinces, shown in Table 1.

The hypotheses are proposed: (1) The costs of mobility have an important effect on the decision of mobility and could be proxied by the distance between the home region and the host region. The costs of mobility will increase as the far distance. Moreover, intra-province is supposed as the dummy variable with a positive effect on mobility. (2) As proved in Crozet [3], workers are more likely to move to the regions with a large market potential due to the low living cost resulted from the price index effect.

3. Theoretical framework

We follow the model of the determinants of mobility in Crozet [3], Tabuchi and Thisse [11]. A mobile worker k from region j and his location choice among R regions ($j \in R$) are considered. We suppose that the mobility decision is decided to maximize the following objective function:

$$\pi_{ji,t}^{k} = V_{ji,t}^{k} + \varepsilon_{i}^{k} = \ln\left[\omega_{i,t-1}\rho_{i,t-1}\left[d_{ij}\left(1+bF_{ij}\right)\right]^{-\lambda}\right] + \in_{i}^{k} \tag{1}$$

where $V_{ji,t}^{k}$ denotes the perceived quality of life in region i at date t for a woker k and $\in_{i}^{k}$ is a stochastic k's personal characteristics in region i. We set $\omega_{i,t-1}$ as the real wage in region i at date $t-1$; $\rho_{i,t-1}$ as the employment probability for a mobile individual region i at date $t-1$; $\left[d_{ij}\left(1+bF_{ij}\right)\right]^{-\lambda}$ as a mobility cost which increases with the distance between home j and host region i. λ is the distance elasticity of mobility cost and b is the strictly positive coefficient.

We assume that a mobile individual k make the decision depending on the comparison of $\pi_{ji,t}^{k}$ among regions at date $t-1$. Therefore, if $V_{ji,t-1}^{k} > V_{jr,t-1}^{k}, \forall i \neq r$, k will choose to move to region i. The probability of choosing region i is obtained as following:

$$P\left(M_{ji,t}\right) = e^{V_{ji,t-1}^{k}} \Big/ \sum_{r=1}^{R} e^{V_{jr,t-1}^{k}} \tag{2}$$

The share of individuals with mobility from region j to region i is:

$$\frac{migr_{ji,t}}{\sum_{i' \neq j} migr_{ji',t}} = \frac{e^{V_{ji,t-1}^{k}}}{\sum_{r=1}^{R} e^{V_{jr,t-1}^{k}} - e^{V_{jj,t-1}^{k}}} \tag{3}$$

We assume that each region in the market produces three categories of goods: manufactured goods x, non-traded services y and a homogeneous traditional good z. The price of z is numeraire, so $p_z = 1$ in all regions.

Therefore, the real wage of mobile individuals in region i is:

$$\omega_{i,t} = \frac{w_{i,t}}{P_{yi,t}^{\phi} P_{xi,t}^{\mu}} \tag{4}$$

where $w_{i,t}$ is the mobile wokers' wage in region i at date t; ϕ and μ are expenditure share of

manufactured goods x and non-traded services y respectively. $P_{xi,t}$ and $P_{yi,t}$ are the CES price index of the aggregate of manufactured goods x and non-traded services y respectively in region i at date t, which are shown as following functions:

$$P_{xi,t} = \left[\sum_{r=1}^{R} n_{xr,t} \left(Bd_{ir}^{\delta} p_{xr,t} \right)^{1-\sigma_x} \right]^{1/(1-\sigma_x)} \tag{5}$$

$$P_{yi,t} = n_{yi,t}^{1/(1-\sigma_y)} p_{yi,t} \tag{6}$$

$$\tau_{ij} = Bd_{ij}^{\delta}, \forall i, j \in [1, R], \delta > 0 \tag{7}$$

where we follow the iceberg transport costs in transporting goods between regions and propose $(\tau_{ij} - 1)/\tau_{ij}$ of the goods melts away and so τ_{ij} (shown in the equation (7)) units of goods should be shipped from region i to transport 1 unit to region j. δ is the elasticity of trade costs to distance. $p_{xi,t}$ and $p_{yi,t}$ are the FOB price of goods in region i at date t:

$$p_{xi,t} = \frac{\sigma_x}{\sigma_x - 1} \beta_x w_{i,t} \tag{8}$$

$$p_{yi,t} = \frac{\sigma_y}{\sigma_y - 1} \beta_y w_{i,t} \tag{9}$$

where σ denotes the elasticity of substitution between varieties; β is the marginal input requirements for production.

$n_{xi,t}$ and $n_{yi,t}$ are the number of firms of goods x and y respectively in region i:

$$n_{xi,t} = \frac{L_{i,t}^{x}}{\varepsilon_x \sigma_x} \tag{10}$$

$$n_{yi,t} = \frac{L_{i,t}^{y}}{\varepsilon_y \sigma_y} \tag{11}$$

where L is the total employment in each region; ε is the fixed input requirements for production.

Using equations (4), (5), (6), (8), (9), (10), (11), the share in equation (3) could be written as:

$$\ln\left(\frac{migr_{ji,t}}{\sum_{i' \neq j} migr_{ji',t}} \right) = \ln\left(L_{i,t-1}^{y} \right)^{\phi/(\sigma_y - 1)} + + \ln\left[\sum_{r=1}^{R} \left(L_{r,t-1}^{x} \right) \left(d_{ij}^{\delta} w_{r,t-1} \right)^{1-\sigma_x} \right]^{\mu/(\sigma_x - 1)}$$
$$+ \ln\left[w_{i,t-1}^{1-\phi} \rho_{i,t-1} \right] + \ln\left[d_{ij} \left(1 + bF_{ij} \right) \right]^{-\lambda} + \tilde{a}_{j,t-1} \tag{12}$$

where $\tilde{a}_{j,t-1}$ is the characteristics of the home region j:

4. Model specification and data

We estimate the following specification of equation:

$$\log\left(\frac{migr_{ji,t}}{\sum_{i' \neq j} migr_{ji',t}} \right) = \beta_1 \log\left(L_{i,t-1} \right) + \beta_2 \log\left(probw_{i,t-1} \right) + \beta_3 \log\left(d_{ij} \right)$$
$$+ \beta_4 F_{ij} + \beta_5 \log\left(S_i \right) + \beta_6 Munic + \beta_7 Intra$$
$$+ \beta_8 Human_{i,t-1} + \beta_9 Human_{j,t-1} + u_{ji,t} \tag{13}$$

Table 2 defines the independent variables. Distance between the home region and the host region is proxied by the nearest railway distances between their respective capital cities. The distance of intr-provincial mobility is proxied by $d_{ii} = (2/3)\sqrt{S_i/\pi}$, where S_i is the surface of region i.

Table 2. Independent variables description

Independent variables	Descriptions	Sign
$L_{i,t-1}$	Ln of (the total employment in region i at date t-1)	-/+
$probw_{i,t-1}$	Ln of (nominal wage×employment rate in region i at date t-1)	+
d_{ij}	Ln of (distance between region i and j)	-
F_{ij}	Dummy variable of no-border, which is one if region i and j do not share a comman border and zero for otherwise	-
S_i	Ln of (surface of region i)	+
Munic	Dummy variable, which is one if region i is the municipal province and zero for otherwise	+
Intra	Dummy variable, which is one if region i and j are in the same provice and zero for otherwise	+
$Human_{i,t-1}$	Average years of education in region i at date t-1	-
$Human_{j,t-1}$	Average years of education in region j at date t-1	-

5. Results

The effect of costs of mobility on the mobility is estimated through 3 independent variables: Firstly, distance plays the expected statistically negative role in mobility. The high value of distance indicates how reluctant farmers are to move to a distant province for work. It looks like that the costs of mobility may increase as the distance between two regions. This result is consistent with the finding in Crozet [3]. Secondly, no-border is the statistically positive factors affecting the mobility. It implies that farmers are more likely to move by crossing more than 1 regional border. Thirdly, intra-province is estimated in column (6). This coefficient is statistically positive affecting migration with a large marginal effect (44%).

The number of total employment in the host region has been always statistically important and negative factor. This variable indicates the market size in the host region and suggests that farmers do prefer small economic regions. Although the policy makers have loosened the *hukou* system, mobility to the large central business district is still limited in terms of the current policy. Therefore, we can conclude that as the proxy of market potential, total employment is statistically significant and negative; farmers in China prefer not far away provinces with small regional markets. We can not obtain the significant effect of expected wage in the host region in all cases. Although there are prominent rural-to-urban income gap in China, farmers are more concerned with the costs of mobility and market size. As the increasing rural-to-urban mobility due to the loosened *hukou* system, there is serious competition for farmers to find a job in a city, they pay more attentions to finding a job in a near region. Human capital in the host region plays a statistically significant and negative effect on the mobility, which implies that farmers are more likely to move to the region with a low educational level due to less education of their own.

Above all, as expected, the costs of mobility reduce the mobility flow by the proxy of distance between the home region and the host region and intra-province mobility. Moreover, we conclude that farmers have not yet followed with large market potential.

Table 3. Result of the determinants of migration and floating migration

Dependent variable: $\log\left(\frac{migr_{ji,t}}{\sum_{i'\neq j} migr_{ji',t}}\right)$

	(1)		(2)		(3)		(4)		(5)		(6)		(7)		(8)	
	Coefficient (SE)	Marginal Effect	Coefficient (SE)	Marginal Effect	Coefficient (SE)	Marginal Effect	Coefficient (SE)	Marginal Effect	Coefficient (SE)	Marginal Effect	Coefficient (SE)	Marginal Effect	Coefficient (SE)	Marginal Effect	Coefficient (SE)	Marginal Effect
Total employment $\log(L_{i,t-1})$	-0.119 ***	-0.119							-0.142 ***	-0.142	-0.114 ***	-0.114			-0.118 ***	-0.118
	(0.027)								(0.033)		(0.027)				(0.027)	
Primary industry employment $\log(L^1_{i,t-1})$			-0.124 ***	-0.124									-0.226 ***	-0.226		
			(0.021)										(0.043)			
Secondary industry employment $\log(L^2_{i,t-1})$					-0.054 **	-0.054							0.094	0.094		
					(0.021)								(0.073)			
Tertiary industry employment $\log(L^3_{i,t-1})$							-0.091 ***	-0.091					0.037	0.037		
							(0.028)						(0.108)			
Expected nominal wage $\log(probw_{i,t-1})$	-0.001	-0.001	-0.019	-0.019	-0.005	-0.005	0.024	0.024	0.006	0.006	-0.012	-0.012	0.015	0.015	0.018	0.018
	(0.032)		(0.031)		(0.032)		(0.033)		(0.032)		(0.031)		(0.053)		(0.038)	
Distcane $\log(d_{ij})$	-0.231 ***	-0.231	-0.239 ***	-0.239	-0.226 ***	-0.226	-0.227 ***	-0.227	-0.232 ***	-0.232	-0.069 **	-0.069	-0.244 ***	-0.244	-0.233 ***	-0.233
	(0.015)		(0.015)		(0.015)		(0.015)		(0.015)		(0.035)		(0.015)		(0.015)	
No-border F_{ij}	0.076 ***	0.076	0.069 **	0.069	0.081 ***	0.081	0.080 ***	0.080	0.078 ***	0.078	-0.109 **	-0.109	0.069 **	0.069	0.075 ***	0.075
	(0.029)		(0.029)		(0.029)		(0.029)		(0.029)		(0.046)		(0.029)		(0.029)	
Surface $\log(S_i)$	0.112 ***	0.112	0.178 ***	0.178	0.068 ***	0.068	0.078 ***	0.078	0.087 ***	0.087	0.059 ***	0.059	0.207 ***	0.207	0.112 ***	0.112
	(0.018)		(0.024)		(0.015)		(0.016)		(0.027)		(0.021)		(0.032)		(0.019)	
Municipal province *Munic*									-0.107	-0.107						
									(0.086)							
Intra-province *Intra*											0.440 ***	0.440				
											(0.086)					
Human capital (host) $Human_{i,t-1}$													-0.056 *	-0.056		
													(0.031)			
Human capital (home) $Human_{j,t-1}$															-0.020	-0.020
															(0.021)	
Constant	1.496 ***	–	0.935 *	–	1.454 ***	–	1.190 **	–	1.897 ***	–	1.195 **	–	0.403	–	1.362 ***	–
	(0.503)		(0.488)		(0.520)		(0.499)		(0.598)		(0.494)		(0.611)		(0.523)	
No. observations	514		514		514		514		514		514		514		514	
R-sq	0.357		0.372		0.338		0.342		0.355		0.386		0.383		0.355	
Root MSE	0.304		0.300		0.208		0.307		0.304		0.378		0.298		0.304	
F-stat	55.58		60.17		51.77		52.85		46.62		53.03		39.23		46.44	
	0.000		0.000		0.000		0.000		0.000		0.000		0.000		0.000	

Notes: ***, **, *, Statistical significant at 1%, 5%, 10% level.

6. Conclusions

Based on the access to market initiated by the new economic geography theory, we estimated the determinants of migration and floating migration in China by running a new economic geography model based on the latest CHIP database. 2990 farmers have moved from rural to urban areas from 1993 to 2002. They comes from rural areas in most of provinces in China and moves to the city in 12 provinces, including Beijing and Chongqing as the province-level municipalities, Shanxi, Liaoning in the north, Jiangsu and Guangdong in the eastern coastal areas, Henan, Hubei and Anhui in the interior, Sichuan, Yunnan and Gansu in the west. 96.6% of farmers with mobility has participated in floating migration, and merely 3.4% of farmers with mobility has taken part in migration.

This paper provided an empirical study of the determinants of migration and floating migration particularly concerned with the costs of mobility and the market potential. We found that total employment, employments in the primary industry, secondary industry and tertiary industry, distance and human capital in the host region are statistically significant and negative factors affecting the mobility. No-border, surface and intra-province play statistically significant and positive role in the decision of mobility. Moreover, the most important finding in this paper was that, the costs of mobility reduce the mobility flow by the proxy of distance between the home region and the host region and intra-province mobility. Especially, according to the statistically significant and negative effect of total employment in the host region on the mobility, we concluded that farmers have not yet followed with large market potential.

Note:

1) *Hukou*: It refers to the household registration system in China. This system classifies citizens into two categories: urban (nonagricultural) and rural (agricultural) residents within a municipality.

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References

[1] Borjas, G.J., "Self-selection and the Earnings of Immigrants," *American Economic Review*, Vol. 77, 1987, pp. 531-553.

[2] Chiquiar, D., and Hanson, G.H., "International Migration, Self-selection, and the Distribution of Wages: Evidence from Mexico and the United States," *Jounal of Political Economy*, Vol. 113, 2005, pp. 239-281.

[3] Crozet, M., "Do migrants follow market potentials? An estimation of a new economic geography model," *Journal of Economic Geography*, Vol. 4, 2004, pp. 439-458.

[4] Fujita, M., Krugman, P.R. and Venables, A.J. (1999), *The Spatial Economy: Cities, Regions, and International Trade*, Cambridge, MA: MIT Press.

[5] Inter-University Consortium for Political and Social Research, "Chinese Household Income Project (2002)," *Link: http://www.icpsr.umich.edu/icpsrweb/ICPSR/studies/21741*.

[6] Krugman, P.R., "Increasing returns and economic geography," *Journal of Political Economy*, Vol. 99, 1991, pp. 483-499.

[7] Laszlo, S., and Santor, E., "Migration, Social Networks, and Credit: Empirical Evidence from Peru," *The Developing Economies*, Vol. 47, No.4, 2009, pp.383-409.

[8] Liang, Y. and Tokunaga, S., "Roles of education and social networks in floating migration: a case study of Hebei Province, China," *Japanese Journal of Rural Economics*, Special Issue, 2010, pp.549-555.

[9] Munshi, K., "Networks in the Modern Economy: Mexican Migrants in the U.S. Labor Market," *Quarterly Journal of Economics*, Vol. 118, 2003, pp.549-599.

[10] Poncet, S., "Provincial migration dynamics in China: Borders, costs and economic motivations," *Regional Science and Urban Economics*, Vol. 36, 2006, pp.385-398.

[11] Tabuchi, T. and Thisse, J.F., "Taste heterogeneity, labour mobility and economic geography," *Journal of Development Economics*, Vol. 69, 2002, pp.155-177.

[12] Todaro, M.P., "A model of labor migration and urban unemployment in less developed countries," *The American Economic Review*, Vol.59, No.1, 1969, pp.138-148.

[13] Wu, Z., "Self-selection and earnings of migrants: evidence from rural China," *Asian Economic Journal*, Vol.24, No.1, 2010, pp.23-44.