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## Abstract

In Chinese cities, rural migrants on average are less educated and poorer than the urban locals. Migration is costly, especially for those who choose to move to provinces faraway from their hometowns. A larger fraction of the rural migrants are self-employed than that of the urban locals. The social contacts of migrants in the host cities often help them to find jobs or to start businesses. We studied the choice of self-employment of rural migrants in Beijing, using a migrant dataset collected from 2007 to 2012. The result shows that the self-employed rural migrants in Beijing tend to be females, migrating from faraway provinces, with more social contacts, and either having the highest education or the lowest. Education and social capital are positively correlated with earning for both wage-earners and self-employed, with different magnitudes. We use a search model to explain this.

**Key Words:** Self-employmen; Rural Migrants; Social Network
**JEL Classification:** J61; R23; Z13

# 1. Introduction

Rural to urban migration in China has been the largest migration event in human history. Many of these rural migrants are poor, at least when they first left their home villages, and on average less educated than urban workers. Despite being poor and relatively unskilled, many of them actually moved to cities faraway from their home town, bearing the high migration costs. In addition, many the migrants are becoming self-employed in the cities, despite having little starting capital. Both phenomena can be partly explained by the social network of the migrants, and we use a search model to do so in this paper.

Migration has been studied by economists for a long time. Economists have concluded that the forces to induce migration between two places, say, between a village and a city, include average earning differential (Hicks, 1963) between a village worker and a city one, the probability of the village worker in finding a job in the city (Todaro, 1969). Other things hinder migration, for example, family (Mincer, 1978), and actual and psychic costs of moving (Greenwood, 1975). Apart from these general patterns, rural to urban migration has special features in developing countries, especially in China.

Chinese rural-urban migrants often decide about where to migrate, and whether to become self-employed after considering about their social network. In this paper, we avoid using the ambiguous term "social capital" (Lin and Ensel et al., 1981; Coleman, 1988; Putnam, 1995) to discuss the migrant's relatives and friends in the cities, but instead use "social network" and "social contacts" to make the distinction. Knowing more people, preferably those with money and power, in a large, developed city like Beijing, can help the potential migrant in two ways: it provides information about potential earnings and labour demand condition in city A; and it helps him to either get a job more easily or lend him money to start his own business. Previous research has found that in Chinese cities, having more social network is correlated with being self-employed in the cities (Yueh, 2009). We focus here on the migrant group.

International evidence, particularly in the US, shows that international immigrants from less developed countries are more likely to enter self-employment (Sanders and Nee, 1996). The economic and social differences between rural and urban China is large, making it similar to that of international migration from a developing country to a developed one. A detailed discussion of China's current institutions dividing the rural and urban sectors is given in section 2, paying special attention to the role of self employment and social network of the migrants.

We use a data set about rural migrant workers in Beijing for this study. The search model we are using gives a prediction about the distribution of the observed wage and self-employment income of the migrant worker, which fits well with the data we have. The data does not contain rural workers who choose not to migrate, so this study is not about the return to migration nor about the return to self-employment. Section 3 gives the model in detail and presents testable hypotheses.

The regression results in section 4 test these hypotheses. Section 5 discusses why we prefer the explanation of the results using our model, ruling out alternative explanations. Section 6 concludes.

# 2. Background: Migration, Self-employment and Social Capital in China

## 2.1 Rural to Urban migration

Chan (Chan, 2010) gives a summary of the Chinese household registration system. The Chinese government established the *hukou* (household registration) system in 1958, essentially creating a rural underclass. Migration from rural areas to the cities was strictly controlled. Rural workers were tied to work on farm land; their productivity is low and farm products' prices were artificially depressed; healthcare and education are worse in villages than in cities. This means that rural workers on average are poorer, less healthy and less educated than urban workers.

The reform at the end of the 1970s gradually allowed rural workers to move into the cities to work as migrant workers. "When China's export-processing industry moved into high gear in the mid-1980s and the 1990s, deployment of rural labour en masse to the cities to supply the industry's demand became a major state strategy." (Chan, 2010) These rural migrant workers live and work in the cities most of the time, but still retain their rural status in the *hukou* system.

Retaining their rural status means that the rural migrant workers do not have full access to the urban healthcare and education. For example, their children have no place in the public education system in the cities they work in and have to attend schools in the home villages. On the other hand, they still pay taxes in the same way as the urban workers. This means their migration is incomplete, much like new international immigrants in developed countries from a developing country, in the sense that they do not have all the rights as a full citizen.

## 2.2 Self-employment of the rural-migrants

The term "rural migrant workers" does not include all people born with a rural *hukou* but later work in the cities. An important exception is rural-born college graduates. When rural students attend state-owned formal colleges in China, their *hukou* status change to "urban", and if they managed to find a city job upon graduation, they keep their urban status. Only those rural graduates who cannot find a job in the cities get their rural status back. Hence, most rural migrant workers do not have a formal college degree.

Since most of the rural migrant workers are relatively less educated, they concentrate in low-skilled jobs, like unskilled manufacture, construction, baby-sitting, and housework. Such jobs are often "dangerous, dirty, and demeaning" (Lee, 1998). Therefore, many rural-migrant workers choose to become self-employed in the cities.

Self-employment revived in China when the reform started, but they are still small in number. Researchers have found that in 2000, self-employment accounted for about 4-5% of the labour force in 13 Chinese cities (Yueh, 2009). Using regional macro data in China, Li (Li and Zhao, 2011) found that the average rate of self-employment is negatively correlated with the level of economic development and concluded that self-employment is a "forced choice" for labour. International evidence also shows that the self-employed earn less than wage earners of comparable skills but have higher levels of satisfaction (Blanchflower, 2000; Hamilton, 2000).

We have shown that Chinese rural migrants are similar to international migrants from developing countries, and the literature has studied migrants' (domestic or international) decision to go into self-employment. Anam (Anam and Chiang, 2007) developed a model where the rural-urban migrants go into self-employment in the cities if urban formal employment is risky, as the migrants' families wish to diversify risks. Yamada (Yamada, 1996) found that rural-urban migrants in Peru who work in "informal" self-employment sectors get comparable level of income as those in "formal" sectors. Portes (Portes and Zhou, 1996) found that in the US, the effect of self-employment is different among the different immigrant groups, while Wang (Wang and Huang et al., 2011) found that post-2000, rural-urban migration is going up in China with rural self-employment going down, suggesting that potential rural entrepreneur are moving to the cities.

### 2.3 Social capital, social network and Self-employment

As rural migrants in China are on average poor and unskilled, they make use of their social network to either get jobs or to get the starting capital for their businesses. Economists and sociologists have had a tradition defining the term social capital and studying its economic return. Coleman (Coleman, 1988) and Putnam (Putnam, 1995) used the term social capital to mean trust and reciprocity in the society, while Lin (Lin and Dumin, 1986) modelled that workers use their positions in society and the strength of ties to get jobs. Montgomery (Montgomery, 1991) developed hiring models, with employers using referrals to screen high ability workers. As the self-employed usually need to borrow money to start their businesses, social network are also shown to be important. Sanders (Sanders and Nee, 1996) found that in the U.S, Asians and Hispanic families pool resources together for their business, using human capital not valued highly by the local labour market. Yueh (Yueh, 2009) found that social network affects the decisions to become self-employed in Chinese cities. Lu (Lu and Ruan et al., 2013) found that in China, income return from social network is high, but migrants do not gain from local and high status ties.

## 3. Model

Internal rural-urban migration in China, though incomplete, is mostly a voluntary choice. Given that China is large, and there are many cities and jobs a potential migrant may pick, we make the economist's assumption that a would-be migrant chooses the cities and jobs that should give him the highest net benefit, based on the information he knows. Therefore, potential migrants do not randomly become actual migrants, and actual migrants are not randomly

"assigned" to cities. This poses a problem for researchers. Rural migrants from any source village are not a random sample of all villagers; the cities the migrant workers from a certain village go to also cannot be a random sample of all cites in China; similarly, a survey of the rural migrants in any host city is not a random sample of all potential or actual migrants in China. This situation is similar to the problem of latent source country income problem in traditional immigration literature, where researchers often do not know how much an international immigrant would earn in his source country.

The inherent non-random sampling means that if we want to calculate the return to migration or self-employment, we need to deal with the sample selection issues and the unobservable characteristics. This is difficult and reliable instrumental variables are hard to find. Hence, we restrict ourselves to build a search-theoretic model following the tradition of the literature on search models (Rogerson et al., 2005) to show what the distribution of incomes of migrants in a particular city should look like, taken the migrants' human capital and social contacts as given.

To give what the distribution should look like, we build a simple search model to give testable hypotheses. The model shows the distribution of observed wages of the migrants in a particular city from a particular province, and it has two sides of the market: firms in city A and currently unemployed (or equivalently, underemployed in farming) rural workers in a province B. City A may not be in province B. City A has $v$ firms and Province B has $u$ unemployed workers, with each firm having exactly one vacancy to be filled.

The product market is perfectly competitive so firms can enter freely, and they are identical. Labour is the only factor of production. Workers are not identical; they differ in their productivity and opportunity costs (see below).

Firms need workers to produce goods, and workers are looking for jobs. A worker meets a firm randomly; when they meet, they negotiate about the wage level the firm is willing to offer to the worker. If the worker finds the wage acceptable, he moves to City A and starts working for the firm; otherwise he remains un(der)emloyed.

The crucial feature of the model is how the workers and firms meet each other. We assume firms need to pay a cost $k$ to advertise the vacancy in order to have the any chance of getting employment. First, we assume that the workers act independently and do not know each other, with no structure of social network. We are agnostic about the matching function which arranges meetings between workers and firms after the firms announce the vacancy, so we use a matching function $m(u,v)$ to denote the number of such random meetings between workers and firms. The matching function is homogeneous of degree 1, such that

$$m(\mu u, \mu v) = \mu m(u,v)$$

Each potential migrant has probability $a_w$ of being matched to a firm in city A, while each vacancy has a probability of $a_e$ of being matched to a migrant in province B. Given the matching function, the relationship between these probabilities and the matching function $m$ is

$$a_w = m(u,v)/u$$
$$a_e = m(u,v)/v$$

In order to judge whether to accept an offer from city A, a worker *i* compares the wage offer to his "outside option" *b*, the opportunity cost of migration. For a migrant, *b* includes a number of things: it may include the economic value of farm work in his village, the wage offers of working in another nearby city (possibly in the same province) as a migrant worker, and the real and psychic cost of migration (which increases with distance). We assume that b is the same for all workers in the same province B; this is indeed a strict assumption, but it makes the model more tractable.

The wage-earning migrants and potential migrants also differ in their labour productivity (can be proxied by education level). Hence, every match has the potential of creating match specific output level $y_i$. Assume $y_i$ depends on the migrant *i*, but not the firm he is matched to since all firms are identical. The productivity *y* has a distribution of *F(y)* in the population of *u* workers. If an agreement is reached, worker *i* gets wage $w_i$ with the firm gets profit $(y_i-w_i)$. If they fail to reach an agreement, the worker gets a value $U_i$ and the firm gets value V. We use $W(w_i)$ to denote the value of wage $w_i$ to the worker and $J(y_i-w_i)$ to denote the value of profit $(y_i-w_i)$ to the firm. The wage $w_i$ is determined by the following generalised Nash bargaining rule, with $\theta$ being the bargaining power of the workers,

$$w \in \arg\max[W(w)-U]^{\theta}[J(y-w)-V]^{1-\theta}$$

Not every meeting results in employment; only those that generating a match-specific output $y_i$ level high to be shared between the firm and the worker will ends with the worker being employed.

When a worker is employed, his job ends with probability of $\lambda$. The time-discount factor is *r*.

All value functions can be defined recursively using Bellman equations. We omit the subscript *i* for individual workers to keep the notation simple, but readers should bear in mind that the *y* and *w* shown below are different for each worker.

$$rW(w) = w + \lambda(U - W(w))$$
$$rJ(y-w) = y - w + \lambda[V - J(y-w)]$$
$$rU = b + a_w\theta\int_{y_R}^{\infty} S_y dF(y)$$
$$rV = -k + a_e(1-\theta)\int_{y_R}^{\infty} S_y dF(y)$$

$S_y$ is the surplus to be shared by the worker and the firm, defined by

$$S_y = J(y-w) - V + W(w) - U$$

and $y_R$ is the reservation productivity, meaning that the worker's productivity $y$ must be higher than $y_R$, or there will be no employment.

The equilibrium level of wage and matching probability can be solved as:

$$y_R = b + \frac{a_w \theta k}{a_e(1-\theta)}$$

$$(r+\lambda)k = a_e(1-\theta)\int_{y_R}^{\infty}(y-y_R)dF(y)$$

The two equations above jointly determine the equilibrium level of reservation wage and rate of worker matching. The first equation shows an increasing relationship between $y_R$ and $a_w$, while the second shows a decreasing relationship between $y_R$ and $a_w$, so a unique equilibrium exists. The model does not predict a relationship between $y_R$ and $a_w$ without more information about *F(y)*. Given that all workers have the same b, $\theta$, $a_w$ and $a_e$, all workers should have the same reservation productivity $y_R$, that is, only workers with productivity higher than $y_R$ will be employed when matched to a firm; other workers will never be employed even if they are matched.

The wage is then given as

$$w_R = y_R$$

$$w = w_R + \theta(y - y_R)$$

The instantaneous migration rate, defined as the proportion of unemployed workers in province B who find employment in city A at any time, is given as

$$MR = a_W[1 - F(y_R)]$$

As stated above, only those workers who are matched to a firm in B and whose productivity is higher than $y_R$ are employed. Since we do not model the exit rate $\lambda$ nor monitor the changes in *u* and *v* over the long run, we cannot explicitly express the long-run equilibrium rate, defined as the percentage of all workers from province B who find employment in city A in equilibrium. But we can say that the long run migration rate must be positively correlated with *MR*.

The above analysis gives the following predictions:

(1) A rise in y leads to a rise in w. More productive migrants earn higher wages.

(2) A rise in b leads to a rise in $y_R$ and $w_R$ and a fall in the long run migration rate. This means as the opportunity cost

of working in city A rises, only those with high productivity migrates, resulting in migrants in B appear to have higher wage. In addition, a higher reservation wage means fewer workers are above this reservation productivity, so fewer people migrate.

Now we introduce the concept of social network in the model. Workers may now meet firms through his friends and relatives who already live in city A. We modify the model a little to see how social networks help the workers to meet firms.

Assume that each of the $v$ firms has 1 worker already working at the firm. An unemployed worker $i$ knows $s_i$ employed workers, and an employed worker $j$ knows $t_j$ unemployed workers. Each employed worker knows the vacancy of the firm he is working at, and will pass the information about the vacancy to the unemployed workers he knows with fixed probability $p$. Assume that the employed worker only passes the information to his immediate neighbour in the social network, so the connections between two employed workers or two unemployed workers are irrelevant. Assume that $u$ and $v$ are large enough that we can ignore the possibility that the unemployed worker is matched to the same firm through both random and network matching. Then, the probability that unemployed worker meets a firm is now given as:

$$a_{wi} = m(u,v)/u + ps_i$$

The first component on right-hand-side is the probability of meeting through random matching, the second the probability of meeting through network.

Similarly, the probability that a firm meet an unemployed worker is

$$a_{ej} = m(u,v)/v + pt_j$$

Now, the reservation wage and matching probability are given as:

$$y_{Ri} = b + \frac{a_{wi}\theta k}{a_{ej}(1-\theta)}$$

$$(r+\lambda)k = a_{ej}(1-\theta)\int_{y_{Ri}}^{\infty}(y - y_{Ri})dF(y)$$

The important difference is that we can no longer omit the subscript $i$ and $j$, as we allow $s_i$ and $t_j$ to vary among unemployed workers and firms. In addition, there is no longer an overall reservation wage for all workers, since each worker now has a unique reservation wage because each worker's $a_{wi}$ is different.

We need to have another model about the self-employed. One simple way to model it is to use the same framework as the above: as labour is the only input in production, and the self-employed needs not to advertise for vacancy since he employs himself, the analysis can be greatly reduced. We no longer need to consider matching and bargaining in the

framework. Assume the self-employed worker $i$ has the same opportunity cost $b$ as the wage-earning worker for migrating, but need to pay an addition start-up cost $k_i$ to start his business. He has probability $a_i$ of finding a business opportunity in city A, and his business end at a rate $\gamma$, his value functions can be written as:

$$rU = b + k_i + a_i \int_{y_{Ri}}^{\infty} [W(y) - U] dF(y)$$

$$rW(y) = y + \gamma[u - W(y)]$$

His reservation income can be solved as:

$$y_{Ri} = b + k_i + \frac{a_i}{r + \gamma} \int_{y_{Ri}}^{\infty} [1 - F(y)] dy$$

Whether this is higher than the reservation wage of the wage earners depend on the parameters of the model: in particular, the relative magnitude of $a$ and $a_w$, $\gamma$ and $\lambda$, and $k_i$. The crucial difference is the value of $k$. When the self-employed starts a business, he usually needs to pay a fixed cost doing so. If he borrows money to pay for the cost, he needs to pay interest on that. As long as $k$ is not zero, if all else being the same, the self-employed should have higher reservation productivity $y_R$ than the wage-earners.

Again, social network enter here in the sense that having more social contacts makes borrowing easier and less costly. In China, when one borrows informally from friends and relatives, one usually pays no interest even if the money is repaid after many years, and one may be able to borrow informally when banks will deny his formal borrowings. Assume that one channel of such borrowing is from one's friends and relatives already working in city A, if we have

$$k'(s) < 0$$

for the self-employed, we should see people with more social network are more likely to be in self-employed than earning wages.

To summarise, the model above gives the following testable hypotheses:

H1. Workers with higher productivity earn more.

H2. Workers with higher opportunity costs have higher wages.

H3. Workers with higher opportunity costs are less likely to migrate.

H4. Other things being equal, the self-employed have higher earnings than the wage-earners as the self-employed have higher opportunity costs.

H5. Having more social contacts does not necessarily mean having higher earnings, but increases the likelihood of being self-employed.

We use a data set from Beijing rural migrant survey to test the above hypotheses.

# 4. Empirical Analysis

The Beijing rural migrant survey is a survey conducted by Peking University Economics Department every year in November. Each year, the department sent around 70-80 students, to look for rural migrant workers around Beijing in about 20 survey locations. Surveyors usually look for migrant workers in shops, factories, construction sites and other places where the migrant workers tend to work in. The survey is designed to cover as much area in Beijing as possible to get a diverse distribution of the migrants. The surveyors are told not to interview more than one migrant from the same workplace, and never include both husband and wife in the survey. The surveyors ask the migrant workers questions from a questionnaire and record the answers to the questions. The questions include the respondent's home own, family, education, experience, current jobs, income, social networks, and plans for the future. Respondents are given a token gift for their time in taking part in the survey. Each year the survey covers slightly more than 1000 respondents.

There are certain advantages of picking Beijing as the sampling point: it is the railway centre in China; people are psychologically attracted to the capital; information about jobs and salary is perhaps easiest to get. It is also representative of big cities in China where small, private businesses are abundant. The disadvantage is that the manufacturing sector in Beijing is quite small, so in cities where medium and large manufacturing firms are the dominant employers, the wage-earners/self-employed ratio among the rural migrant workers may be quite different. We make a note here so that the results should not be extrapolated to other cities with different industrial structures.

In 2008, 2009, 2010 and 2012 the survey asked about both the migrant's social networks and the self-employment status; in other years it did not. Therefore we restrict our attention to these 4 years and call these 4 years the full sample. Table 1 gives the summary statistics of the surveyed 4034 migrant workers in Beijing. Column 1 is for the whole sample. Column 2 and 3 are for the wage-earners and the self-employed.

**Table 1**

| VARIABLES | Full | Wage | Self |
|---|---|---|---|
| | mean | mean | mean |
| | (sd) | (sd) | (sd) |
| Female | 0.386 | 0.346 | 0.472 |
| | (0.487) | (0.476) | (0.499) |
| Age | 30.35 | 29.58 | 32.01 |
| | (11.05) | (11.31) | (10.27) |
| Married | 0.548 | 0.476 | 0.701 |
| | (0.530) | (0.537) | (0.481) |
| Primary School and above | 0.974 | 0.979 | 0.964 |

| | | | |
|---|---|---|---|
| | (0.159) | (0.144) | (0.186) |
| Secondary School and above | 0.865 | 0.884 | 0.824 |
| | (0.342) | (0.320) | (0.381) |
| High School and above | 0.397 | 0.428 | 0.329 |
| | (0.489) | (0.495) | (0.470) |
| Vocational College and above | 0.108 | 0.126 | 0.0708 |
| | (0.311) | (0.331) | (0.257) |
| University and above | 0.0345 | 0.0404 | 0.0218 |
| | (0.182) | (0.197) | (0.146) |
| Experience | 7.251 | 6.484 | 8.891 |
| | (6.835) | (6.640) | (6.959) |
| Distance from home to Beijing | 2.415 | 2.374 | 2.503 |
| | (1.121) | (1.137) | (1.082) |
| Self employed | 0.319 | 0 | 1 |
| | (0.466) | | |
| Adjusted real monthly income | 3,393 | 3,126 | 3,963 |
| | (4,450) | (4,043) | (5,170) |
| Hours worked per month | 202.9 | 191.4 | 227.5 |
| | (122.2) | (112.1) | (138.2) |
| Area of farmland in Village (mu) | 6.280 | 6.537 | 5.729 |
| | (13.19) | (14.99) | (8.048) |
| Observations | 4,034 | 2,748 | 1,286 |

We use an ordinal number to measure the distance from the migrant's home town to Beijing. If the migrant is from Beijing's rural neighbourhood, we give the distance a measure 0; if the migrant is from Beijing's neighbour province (Hebei), we give the distance a measure 1; if the migrant is 2 provinces away he has a distance measure of 2; and so on. We cap the maximum distance measure at 5. While this is not a precise measure of the actual geographical distance, we feel that it serves our purpose.

We use the marginal education degree to count the education degree a person has, so all coefficients in the regressions on education variables can be interpreted as the effect of a marginal degree. For example, in table 1 we see that 0.974 of all migrants have primary education. This means 97.4% of the migrants have primary education or above. Similarly, 86.5% have at least secondary education, 39.7% have high school, and so on.

We use “adjusted real income”, not the reported income in the survey, as a measure of the real wage in our analysis. The reported income of in the survey needs to be adjusted by the in-kind benefit that migrant workers receive from their employers or their own business. When migrants come to Beijing to work temporarily, one of the biggest living costs is housing. In addition, food cost may well be substantial. Some of the employers provide benefit in kind in addition to the wage, like free housing and food. Some of the self-employed also report that their work include a benefit of "housing" or "food", which probably means that they live in their shops or count their food expense as part of their business expense. In any case, the income of the migrants should include the food and housing benefit in-kind, so researchers can make meaningful comparisons between the group who receives such benefit and the group who does not. The survey asked about the average monthly housing and food expenses, so we can make adjustment this way: we first compute for each year we compute the median level of housing expense among all migrants who do not receive free housing, and the median level of food expense among all migrants who do not receive free food; we then add the imputed housing and food benefit to the monthly income of the migrant who report that they receive housing and food benefit from their jobs. All adjusted incomes are then deflated by the consumer price index from the statistical yearbooks to represent them in 2008 yuan.

Table 1 shows a number of things about the self-employed. The first is that they are a large group: 31.9% of all rural migrants in our survey are self-employed. To put this into perspective, another survey from NBS shows that of all people working in Beijing only around 10% are self-employed. Column 2 and 3 shows that the self-employed earn more, are older and more experienced, come from farther provinces, and work more hours per month than the wage earners. But they appear to be less well educated: the share of self-employed migrants in any education category is lower than the share of the wage earners in any education category.

We are first interested in where the migrants came from and test hypothesis H2. To do this, we count the total number of migrants from each province in these 4 years. Our sample contains migrants from 31 provinces out of all 33 provinces in mainland China,. Table 2 shows the average urban income in the migrants’ home provinces from China’s statistical yearbook, while Table 3 counts the average number of migrants from each group of provinces in our Beijing rural migrant sample; in each table, the average is taken over the provinces who has the same ordinal distance to Beijing. The province that has distance of 0 to Beijing is Beijing itself.

**Table 2**

Average Urban Wage in the Provinces, by Distance

| Distance to Beijing | Number of Provinces | 2008 | 2009 | 2010 | 2012 | All 4 Years |
|---|---|---|---|---|---|---|
| 0 | 1 | 46507 | 56328 | 57779 | 75482 | 59024 |
| | | 0 | 0 | 0 | 0 | (12060) |
| 1 | 1 | 19911 | 24756 | 27774 | 35309 | 26938 |
| | | 0 | 0 | 0 | 0 | (6453) |
| 2 | 6 | 24221 | 28773 | 31553 | 40902 | 31362 |
| | | (5316) | (6426) | (6228) | (7639) | (8663) |

| | | | | | | |
|---|---|---|---|---|---|---|
| 3 | 7 | 22625 | 26419 | 29379 | 38216 | 29160 |
| | | (2955) | (3516) | (3508) | (4785) | (6841) |
| 4 | 8 | 22802 | 26344 | 28850 | 37582 | 28895 |
| | | (4084) | (4291) | (4156) | (4520) | (6868) |
| 5 | 8 | 28692 | 32352 | 34279 | 43511 | 34708 |
| | | (12159) | (12750) | (11905) | (14138) | (13343) |
| Total | 31 | 25228 | 29298 | 31792 | 41047 | 31841 |
| | | (8212) | (9134) | (8626) | (10631) | (10794) |

**Table 3**

Average Number of rural migrants in Beijing, by Distance

| Distance to Beijing | Number of Provinces | 2008 | 2009 | 2010 | 2012 | All 4 Years |
|---|---|---|---|---|---|---|
| 0 | 1 | 2 | 9 | 1 | 17 | 7.25 |
| 1 | 1 | 208 | 321 | 256 | 282 | 266.75 |
| 2 | 6 | 68.5 | 101.7 | 73.2 | 114.3 | 89.4 |
| 3 | 7 | 34.7 | 46.4 | 29.0 | 46.6 | 39.2 |
| 4 | 8 | 24.4 | 28.9 | 20.1 | 28.1 | 25.4 |
| 5 | 8 | 2.6 | 5.5 | 8.0 | 4.0 | 5.0 |
| Total | 31 | 34.8 | 49.7 | 36.3 | 50.6 | 42.8 |

From the first table, we can see that on average, Beijing has higher urban income than all other groups of provinces in the 4 years. Also, the provinces farthest away from Beijing (distance=5) have higher urban incomes than the rest of the provinces. These provinces include the rich, coastal provinces in south-east China. From the next table we can see that there are more migrant workers per province from nearby provinces, especially from the province with distance=1 (Hebei province), as the average number of migrants falls as distance increases.

With these data we could test H2: there should be more migrants from provinces which are closer and have lower average urban wage: both short distance and lower average urban wage means lower opportunity cost, so the migration rate should be higher.

To approximate the long-run migration rate between each province and Beijing, we divide the number of the rural migrants in Beijing from each province in each year in the sample by the total population of that province to get a "migration rate". The unit of this "migration rate" is the number of migrants to Beijing per million people. If out sample is a representative sample, this migration rate should be proportional to the actual long-run equilibrium migration rate.

As we are uncertain whether the rural income or the urban income in the home provinces is a more appropriate measure of the opportunity cost *b*, we include both in the regression. We first divide the average urban and rural

income in each province by the Beijing urban income in the same year to arrive at relative urban and rural wages (the relative wages become a stationary series this way). We expect to find that the migration rate is negatively correlated with the relative wages and the distance.

The table 4 shows the regression results:

**Table 4**

| VARIABLES | migrate_rate |
|---|---|
| Relative urban income | -0.0294*** |
| | (0.00956) |
| Relative rural income | 0.0251 |
| | (0.0377) |
| Distance to Beijing | -0.00874*** |
| | (0.000790) |
| Constant | 0.0590*** |
| | (0.00477) |
| Observations | 124 |
| R-squared | 0.534 |

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

As we can see, relative urban income and distance to Beijing are indeed negatively correlated with the migration rate, while the relative rural income is positive and statistically insignificant. The equation has a good fit of 0.534. This means we can not to reject hypothesis 2, and perhaps relative urban income is a more appropriate measure of opportunity cost than relative rural income. Based on this result, we use relative urban income as the measure for opportunity cost in the test of other hypothesis.

We then move on to test hypothesis H3: migrants with larger *b* have higher wages. As we also include the standard Mincer-type productivity measures in the regression equation, we also test H1, higher productivity workers earn more.

We would like to pool observations from all 4 years together to give more observations, treating the full sample as a big cross-section data. As both the migrants' real wage and their opportunity cost are going up over time, if we use the data for 4 years without any treatment, there will be a spurious correlation between the wage and our measure of opportunity cost. To make the data stationary and the results meaningful, we demean the log of adjusted real income and the log of the real home urban income by the respective mean. We are not interested in the average

income growth from year to year, so this method does not lose much information.

We would also like to know if have more people in the social network improves earnings directly. The survey asks the respondents about their number of friends and relatives in Beijing, and group these friends and relatives into two groups: those whom the migrants knew before coming to Beijing and those whom the migrants met after coming to Beijing. We call these two numbers the "old" and "new" friends and use them in equation 4.

In addition, the survey also asks the respondent the jobs of the people they know in their social network, for example, if there is a doctor or a policeman in their social network. The survey lists 20 such jobs. Knowing someone who has a more prestigious job presumably helps the migrant more: he may have more information, and his recommendation carries more weight. Hence, we use a measure of "occupational prestige" to reflect the fact that some contacts may be more valuable than others. Occupational prestige refers to the consensual nature of rating a job based on the belief of its worthiness. The survey data use the measurement of occupational prestige the same as (Bian, 1997) based on Lin's position generator (Lin and Dumin, 1986). We include two measures in equation 5: the highest prestige (maximum score), and the difference between the highest prestige and the lowest (score), to test if knowing someone with a prestigious job or knowing a wide range of people helps the migrants. See Appendix A for a list of the occupations and the assigned prestige.

Using the monthly demeaned wage as the dependent variable, the results are shown in the following table 5:

**Table 5**

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| | Full | Wage | Self | Network | Network+Prestige |
| VARIABLES | ln_wage_demean | ln_wage_demean | ln_wage_demean | ln_wage_demean | ln_wage_demean |
| Female | -0.169*** | -0.173*** | -0.156*** | -0.158*** | -0.157*** |
| | (0.0170) | (0.0174) | (0.0374) | (0.0171) | (0.0169) |
| Age | 0.0187*** | 0.0141*** | 0.0325** | 0.0146*** | 0.0125** |
| | (0.00516) | (0.00497) | (0.0127) | (0.00521) | (0.00515) |
| Age^2 | -0.000328*** | -0.000262*** | -0.000546*** | -0.000264*** | -0.000228*** |
| | (6.59e-05) | (6.32e-05) | (0.000163) | (6.66e-05) | (6.58e-05) |
| Married | 0.0428** | 0.0391* | 0.0503 | 0.0351 | 0.0355* |
| | (0.0215) | (0.0207) | (0.0521) | (0.0216) | (0.0213) |
| Primary School | 0.000692 | 0.0467 | -0.0920 | 0.00409 | -0.00986 |
| | (0.0538) | (0.0581) | (0.107) | (0.0536) | (0.0529) |
| Secondary School | 0.165*** | 0.0948*** | 0.262*** | 0.165*** | 0.148*** |

| | | | | | |
|---|---|---|---|---|---|
| | (0.0267) | (0.0280) | (0.0551) | (0.0267) | (0.0264) |
| High School | 0.0739*** | 0.0640*** | 0.110** | 0.0737*** | 0.0564*** |
| | (0.0183) | (0.0179) | (0.0433) | (0.0185) | (0.0183) |
| Vocational College | 0.160*** | 0.147*** | 0.213** | 0.154*** | 0.117*** |
| | (0.0316) | (0.0292) | (0.0872) | (0.0316) | (0.0314) |
| University or above | 0.0415 | 0.0544 | -0.0256 | 0.0427 | 0.0360 |
| | (0.0500) | (0.0455) | (0.145) | (0.0509) | (0.0502) |
| Experience | 0.00964*** | 0.00879*** | 0.0116*** | 0.0103*** | 0.00973*** |
| | (0.00143) | (0.00142) | (0.00326) | (0.00144) | (0.00142) |
| Distance from home to Beijing | 0.0464*** | 0.0340*** | 0.0625*** | 0.0430*** | 0.0421*** |
| | (0.00711) | (0.00699) | (0.0169) | (0.00717) | (0.00707) |
| Average Urban Income, demeaned | 0.209*** | 0.0972** | 0.395*** | 0.216*** | 0.204*** |
| | (0.0466) | (0.0467) | (0.105) | (0.0470) | (0.0464) |
| Self employed | 0.105*** | | | 0.114*** | 0.119*** |
| | (0.0180) | | | (0.0181) | (0.0179) |
| year | -0.00744 | 0.00387 | -0.0295** | -0.00161 | 0.00471 |
| | (0.00600) | (0.00596) | (0.0137) | (0.00613) | (0.00610) |
| Area of land in Village (mu) | | | | 0.00102* | 0.000841 |
| | | | | (0.000581) | (0.000574) |
| No of relatives in Beijing | | | | 0.00130 | 0.000969 |
| | | | | (0.000929) | (0.000919) |
| sc_friend_old | | | | 0.000196 | -9.43e-06 |
| | | | | (0.000329) | (0.000326) |
| sc_friend_new | | | | 0.00145*** | 0.000751** |
| | | | | (0.000284) | (0.000297) |
| sc_max_score | | | | | 0.00187*** |
| | | | | | (0.000316) |
| sc_scope | | | | | 0.0119*** |
| | | | | | (0.00384) |
| Industry dummies | Yes | Yes | Yes | Yes | Yes |
| Constant | 14.46 | -8.143 | 58.46** | 2.778 | -9.998 |
| | (12.07) | (11.97) | (27.58) | (12.31) | (12.25) |

| | | | | | |
|---|---|---|---|---|---|
| Observations | 4,071 | 2,769 | 1,302 | 3,929 | 3,929 |
| R-squared | 0.139 | 0.174 | 0.124 | 0.153 | 0.176 |

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Equation 1 is for the whole sample, equation 2 for the wage-earners, equation 3 for the self-employed. Equation 4 and 5 include the social capital variables, again for the whole sample.

The results show the following standard Mincer equation results: older, more experienced workers earn more, but the marginal effect of age goes down with age; getting additional education degrees help workers earn more, although the result is not significant for university degrees; females earn less than males. The coefficients on age, experience, education, sex all have the standard Mincer-type regression signs. Distance to Beijing is positively correlated with income; so is the log of the average rural income in the source province. Both of these are positively correlated with the value of the outside option or opportunity cost in the earlier model, and the result lends support to the model's prediction that higher *b* results in increased wage in the distribution. The models fail to reject hypotheses 3 and 4, showing that people with higher opportunity cost have higher wages, and the self-employed earn higher income than the wage earners.

Compare equation 2 and 3 we see that the signs and statistical significance are similar among the self-employed and the wage earners. Primary school and university education seems to have no economic return for the rural migrants. Since the university degree holders among migrants are usually those who failed to find a job in the cities when they graduate, this is perhaps not surprising. One thing worth nothing is that the income of the self-employed falls with year, when this is not the case for the wage-earners. This may reflect the fact that entry drives profit down, especially so since the starting year in this sample is 2008, when the holding of the Beijing Olympics in the summer forced many rural migrants to move away from Beijing, and the returning of those afterwards gradually makes the self-employed market more competitive.

Equations 4 and 5 include the social network variables. We can see in (4) that knowing more relatives and old friends carry no return; only the new friends help the migrants to earn higher income. Presumably “old” contacts help the migrants to get to Beijing, but once they are in Beijing they receive no more help than the other migrants who also made it to Beijing. There can be no doubt that having more old friends should be positively correlated with income, but the reference group should be those who have not made it to Beijing. In (5), we see that both maximum score and scope in one’s network carry returns. This result is similar to Lin (Lin and Dumin, 1986). To put these numbers in perspective, the highest score is 95 while the lowest is 4. Knowing someone with a score of 95 generates a return of 0.00187*95=0.178, similar to about 13 years in age and higher than getting a vocational college degree.

One may prefer to use the log of hourly wage as the dependent variable as a better measure for productivity. If

we use the log of the demeaned hourly wage as the dependent variable, the results are shown in table 6:

**Table 6**

| VARIABLES | (1) wage1h ln_wage_hour_demean | (2) wage2h ln_wage_hour_demean | (3) wage3h ln_wage_hour_demean | (4) wageh_sc ln_wage_hour_demean | (5) wageh_sc_score ln_wage_hour_demean |
|---|---|---|---|---|---|
| Female | -0.162*** | -0.152*** | -0.174*** | -0.149*** | -0.148*** |
| | (0.0194) | (0.0208) | (0.0407) | (0.0196) | (0.0194) |
| Age | 0.0186*** | 0.0190*** | 0.0234* | 0.0143** | 0.0120** |
| | (0.00588) | (0.00595) | (0.0138) | (0.00596) | (0.00590) |
| Age^2 | -0.000338*** | -0.000325*** | -0.000467*** | -0.000270*** | -0.000233*** |
| | (7.51e-05) | (7.58e-05) | (0.000178) | (7.62e-05) | (7.54e-05) |
| Married | 0.00407 | 0.0162 | -0.0269 | -0.00267 | -0.00246 |
| | (0.0244) | (0.0248) | (0.0567) | (0.0246) | (0.0243) |
| Primary School | 0.0522 | 0.106 | -0.0502 | 0.0560 | 0.0421 |
| | (0.0612) | (0.0695) | (0.116) | (0.0612) | (0.0605) |
| Secondary School | 0.156*** | 0.0770** | 0.260*** | 0.157*** | 0.139*** |
| | (0.0304) | (0.0336) | (0.0599) | (0.0305) | (0.0302) |
| High School | 0.104*** | 0.101*** | 0.119** | 0.109*** | 0.0898*** |
| | (0.0209) | (0.0214) | (0.0471) | (0.0211) | (0.0209) |
| Vocational College | 0.235*** | 0.221*** | 0.284*** | 0.226*** | 0.186*** |
| | (0.0359) | (0.0349) | (0.0948) | (0.0361) | (0.0359) |
| University or above | 0.104* | 0.120** | 0.0163 | 0.119** | 0.108* |
| | (0.0570) | (0.0544) | (0.160) | (0.0582) | (0.0576) |
| Experience | 0.00868*** | 0.00738*** | 0.0123*** | 0.00932*** | 0.00873*** |
| | (0.00163) | (0.00170) | (0.00355) | (0.00165) | (0.00163) |
| Distance from home to Beijing | 0.0377*** | 0.0209** | 0.0651*** | 0.0339*** | 0.0329*** |
| | (0.00810) | (0.00837) | (0.0184) | (0.00819) | (0.00809) |
| Average Urban Income, demeaned | 0.206*** | 0.0873 | 0.378*** | 0.219*** | 0.205*** |
| | (0.0530) | (0.0558) | (0.115) | (0.0537) | (0.0531) |
| Self employed | -0.0380* | | | -0.0280 | -0.0232 |

| | | | | | |
|---|---|---|---|---|---|
| | (0.0205) | | | (0.0207) | (0.0205) |
| year | -0.00756 | -0.000309 | -0.0221 | -0.00192 | 0.00550 |
| | (0.00684) | (0.00713) | (0.0150) | (0.00700) | (0.00698) |
| Area of landland in Village (mu) | | | | 0.00114* | 0.000932 |
| | | | | (0.000664) | (0.000656) |
| No of relatives in Beijing | | | | 0.00138 | 0.000979 |
| | | | | (0.00106) | (0.00105) |
| sc_friend_old | | | | 0.000195 | -8.72e-06 |
| | | | | (0.000376) | (0.000372) |
| sc_friend_new | | | | 0.00146*** | 0.000792** |
| | | | | (0.000324) | (0.000339) |
| sc_max_score | | | | | 0.00229*** |
| | | | | | (0.000362) |
| sc_scope | | | | | 0.00857* |
| | | | | | (0.00439) |
| Industry dummies | Yes | Yes | Yes | Yes | Yes |
| Constant | 14.80 | 0.259 | 43.68 | 3.494 | -11.49 |
| | (13.75) | (14.33) | (30.08) | (14.08) | (14.04) |
| Observations | 4,060 | 2,764 | 1,296 | 3,920 | 3,920 |
| R-squared | 0.136 | 0.151 | 0.136 | 0.145 | 0.166 |

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Again, the hourly wage increases with education, age, exp, and so on, just as the case with monthly income. The sign on the coefficient on self employed becomes negative. The result shows that self employed migrants have either lower (1) or the same (4)(5) hourly wage than wage-earning ones. This is driven largely by the fact that the self employed from richer provinces work more hours than those from poorer provinces. To understand this more fully, we may need an explicit and more general formulation of *b* and *w* to combine leisure and income. One result remains robust: those from provinces farther away have higher hourly wage.

Compare equation 2 and 3 we see that the self-employed have higher returns for levels of education, age, and experience. Combine this with the fact that the self-employed have lower education level than the wage-earners, better educated workers perhaps could try self-employment.

Equation 4 and 5 show the essentially same result as before. New friends, the maximum score and the scope generate statistically significant return, while old friends do not.

Finally, we study the decision to become self-employed and test hypothesis 5. We use a probit model, making the binary variable of whether the person is self-employed as the dependent variable. The result is shown in the table below:

**Table 7**

| | (1) | (2) |
|---|---|---|
| | self1 | self2 |
| VARIABLES | employ_self | employ_self |
| Age | 0.0264*** | 0.0270*** |
| | (0.00452) | (0.00452) |
| Age^2 | -0.000370*** | -0.000379*** |
| | (5.88e-05) | (5.89e-05) |
| Female | 0.113*** | 0.113*** |
| | (0.0147) | (0.0147) |
| Primary School | -0.0485 | -0.0453 |
| | (0.0498) | (0.0498) |
| Secondary School | -0.0307 | -0.0273 |
| | (0.0248) | (0.0248) |
| High School | -0.0305* | -0.0269 |
| | (0.0169) | (0.0169) |
| Vocational College | -0.0743** | -0.0676** |
| | (0.0291) | (0.0293) |
| University or above | -0.0211 | -0.0205 |
| | (0.0464) | (0.0464) |
| Married | 0.118*** | 0.117*** |
| | (0.0199) | (0.0198) |
| Distance from home to Beijing | 0.0258*** | 0.0260*** |
| | (0.00656) | (0.00655) |
| Average Urban Income, demeaned | 0.119*** | 0.121*** |
| | (0.0424) | (0.0425) |
| No of relatives in Beijing | 0.00434*** | 0.00442*** |
| | (0.00111) | (0.00111) |

| | | |
|---|---|---|
| sc_relative_sq | -4.86e-06*** | -4.97e-06*** |
| | (1.23e-06) | (1.23e-06) |
| sc_friend_old | -0.000790 | -0.000643 |
| | (0.000575) | (0.000579) |
| sc_friend_old_sq | 1.14e-06 | 9.70e-07 |
| | (7.82e-07) | (7.86e-07) |
| sc_friend_new | 0.000839* | 0.00117** |
| | (0.000466) | (0.000487) |
| sc_friend_new_sq | -1.52e-06 | -2.07e-06 |
| | (1.42e-06) | (1.43e-06) |
| sc_max_score | | -0.000270 |
| | | (0.000292) |
| sc_scope | | -0.00436 |
| | | (0.00359) |
| Constant | -0.183** | -0.181** |
| | (0.0880) | (0.0881) |
| Observations | 4,068 | 4,068 |
| R-squared | 0.080 | 0.081 |

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

We can see that older, female, married migrants are more likely to become self-employed. Having better education makes one LESS likely to be self-employed. Coming from faraway provinces with higher rural income makes one more likely to be self-employed. While knowing more relatives do not seem to affect earnings, it does seem to affect the choice of self-employment positively, as the coefficient on relatives is positive and significant. Knowing more friends is only marginally significant, while maximum social network score and scope do not seem to affect self-employment choices. Only knowing more new friends seems to affect the probability of being self-employed. So hypothesis 5 is only partly justified.

## 5. Discussion

Our results show that the self-employed do not earn higher hourly wage than the self-employed. They do work more hours, however, so their average monthly income is higher. We see that in our sample, those coming from faraway provinces and higher urban income in the home province tend to have higher income and be self-employed.

We conjecture that the outside option *b* must include considerations of both the distance to Beijing and the urban income in the home province. The reason we see those with higher outside option value working as self-employed is that self-employment gives them the opportunity to work more hours to get higher income, while wage-employment cannot offer them as many hours to work. Hence, these people may have low value of leisure, a measure we cannot observe in the data.

Having a large social network increases the probability of finding a job or new business opportunity by providing contacts. With increased probability of getting new offers, migrants turn down low wage offers and self-employed wait for better opportunities. Hence, we see that social network is positively correlated with earnings for both wage-earners and the self-employed.

In addition, knowing more friends and relatives may provide means for the migrant to borrow money to start his own business.

An alternative interpretation of results is possible: those who enter into self-employment are those from richer provinces with higher average urban/rural income. Compared to the migrants who come from poorer provinces, they either had better quality education or better entrepreneur skills. While this also explains some of the results, it does not explain why distance enters positively into the income equations and the self-employment equations, as we have already controlled for the average urban income, which should be correlated with the higher quality education or better entrepreneur skills. Hence, we prefer the first interpretation.

## 6. Conclusion

This paper is the first paper we know which uses the search model to study the decision to migrate and to enter self-employment. Many Chinese rural migrant workers move across several provinces to work in cities. They must have face the information asymmetry, not knowing exactly what the jobs, the wage, and the general level of amenity in the host city are like. Similarly, we all know that only few people are willing to work as self-employed, as the risks are high and income is variable; so, being self-employed in an alien city must be even harder. Migrants need to actively search for job opportunities in other cities to get more information, and we feel that the use of the search model is appropriate.

We use survey data on migrant workers in one city for our study. It serves the purpose of providing tests for our simple search model, but it also has limitations. We are not sure if any of our results can be generalised to migrants in other cities. Maybe migrants to Beijing are in some ways different from migrants to other cities, and we do not know about the exact differences. We also did not study the migrants' decision to pick Beijing as the destination. Surely the migrants in Beijing had solved a maximisation problem to pick Beijing as the solution; but the options are too many, too complicated to study; and we do not have data about other possible places the migrants could go. Most

importantly, our empirical tests do not prove that our model is correct. Most of the results are consistent with what the model predicts, but other interpretations are possible.

At this stage, we are content that the model is able to explain our regression results: the distance to Beijing, the average urban wage in the home province, and the value of social network are all positively correlated with earning and the decision to become self-employed. We believe they either affect the value of the outside option or the cost of searching. When the value of the outside option is high and search is costly (matching is difficult), the migrants need a high earning in order to be compensated, so they migrate only when the expected income is high. Future work may be directed to understand the search behaviour of the migrants, for example, how quickly they find their first jobs in a new city and how often they change jobs, and we leave that to be another paper.

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**Appendix A. Occupational Prestige**

Scientific researcher: 95
Professor: 91
Engineer: 86
Lawyer: 86
Doctor: 86
Chief executive of government administration: 80
Teacher of elementary or middle school: 77
Head of Party or other organizations: 73
Head of enterprise and public institution: 71
Officer of business administration: 64
Accountant: 58
Clerk of public institution: 53
Policeman: 52
Nurse: 48
Driver: 25
Chef or cook: 24
Industrial worker: 20
Salesperson: 15
Waiter: 11
Household service personnel: 6