

**Non-agricultural Unemployment in Beijing: A Multilevel Analysis**

**Dudley L. Poston, Jr.**

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**Chengrong Charles Duan**

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**(author information)**

**Dudley L. Poston, Jr.**

**Department of Sociology**

**Texas A&M University**

**College Station, Texas 77843**

**phone: 409-862-3947**

**FAX: 409-862-4067**

**Email: [Dudley@tamvm1.tamu.edu](mailto:Dudley@tamvm1.tamu.edu)**

**Chengrong Charles Duan**

**Institute of Population Research**

**Renmin (People's) University of China**

**Beijing 100872**

**People's Republic of China**

**Email: [duancr@yahoo.com](mailto:duancr@yahoo.com)**

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### **Abstract**

In this paper, we undertake a multilevel investigation of non-agricultural unemployment in Beijing. We use data for the employed and unemployed resident population of Beijing from the 1995 1% Population Sample Survey of China. The dependent variable is the person's unemployment status. The individual level independent variables are the worker's sex, age, his/her years of education, and whether he/she is a temporary (floating) resident of Beijing. The macro level characteristics are the area's level of labor force diversity, and its degree of concentration of persons who have attended college. The higher the labor force diversity and the higher the concentration of graduates, the less the likelihood of unemployment.

We use a multilevel model, specifically a hierarchical generalized linear model, to assess the likelihood of non-agricultural unemployment of Beijing residents. We determine the extent to which the human capital characteristics of the persons themselves, as well as the contextual characteristics of their residential regions, influence their likelihood of being unemployed. We find that both micro and macro factors are important in predicting the probability of being unemployed among Beijing residents. We address these issues and draw out their implications.

## **Introduction**

Since the founding of the People's Republic of China in 1949, the Communist government has adopted a policy of "full employment," which is meant to ensure that every person who wants to be employed has a job. Although such a policy was economically inefficient, and, moreover, although "undercover" unemployment existed just about everywhere in China, the Communist leaders believed that "full employment" was attainable in a socialist system. The phenomenon of unemployment was viewed as a consequence of capitalism, an outcome that could be completely avoided in socialist societies (Song, 1983).

In China, it has really only been since the early 1990s that unemployment has been a major problem, and we discuss later this issue in greater detail. Suffice it for now for us to note that in 1998 alone, about 3 million state-owned enterprise workers became unemployed.

In this paper, we undertake a multilevel investigation of non-agricultural unemployment in Beijing, the capital city of China. In 1995 the Beijing Municipality had an unemployment rate of just over 4 percent. In our analysis we use data for the employed and unemployed resident populations of Beijing taken from the 1995 1% Population Sample Survey of China. We examine the extent to which characteristics of the persons, as well as characteristics of the neighborhoods in which they live, influence the probability of their being unemployed. Prior to our conducting this analysis, however, we consider in more detail the issue of unemployment in China, so to be better able to place our analysis in the proper perspective.

## **Unemployment in China**

Until recently, unemployment was viewed by the Chinese Communists as a consequence of capitalism, and was an outcome that could be completely avoided in socialist societies. However, in actuality, "full employment," was really only possible for persons living in urban areas and holding urban household registrations (*hukous*).

Farmers have never been covered under the concept of "full employment." They have been thought to be "naturally employed" by virtue of their living in agricultural areas. Hence, when a young person in a farming family becomes an adult, he/she only needs the bare minimum farming equipment provided by his/her family to be able to join the household or local production collective and thereby take and cultivate his/her own share of land.

At times in China, increases in the size of the population of young urban adults have tended to make "full employment" in the cities impossible. When this occurred, the government sent the excess urban workers to the countryside. For instance, during the period of 1968-76, new entrants into the labor force were so numerous that the system could not absorb them. Thus most were sent to the countryside to seek work. This was the period of the so-called "(Urban) Educated Youth Going to the Countryside Movement"; about 15 million urban young men and women from urban areas were sent to the hinterlands, most of them to remote and sparsely populated areas such as in Yunnan and Heilongjiang Provinces.

The period just mentioned is also known inside and outside China as the Cultural Revolution. A reviewer of an earlier version of this paper asked whether ideology and

politics played an important role in the Cultural Revolution. This is an important question, and certain aspects of the Cultural Revolution were indeed responses to ideology and politics. For instance, the “Chuan Lian” movements (that is, going to different cities and “becoming united”) of the hundreds of thousands of “Red Guards” (mainly middle school students) were an important part of the “Cultural Revolution” and were largely motivated by Mao’s wish to re-gain control of the party. On the other hand, the “going to the countryside” movements of the urban educated youth, mentioned above, were basically economically motivated, but were covered under the political slogan of “being re-educated by the peasants.”

So, the “Chuan Lian” movements of the “Red Guards” and the “going to the countryside” movements of the urban educated youth were two very different processes. The former was more of a political process, and the latter more of an economic one.

Recently in the 1990s, when unemployment has become more of a reality in many cities, some urban planners have encouraged the laid-off workers to go to the suburban rural areas for work, resulting in considerable controversy and criticism (Duan, 1999). Indeed the word "unemployment" has been pretty much avoided in political and government discourse. Instead, the term “waiting for employment” has been used to refer to the “unemployed” residents of urban areas.

In some respects the phenomenon of increasing urban unemployment is associated with the loosening of internal migration constraints, and in other respects it is not. Some Chinese scholars hold the opinion that the huge “floating population” has worsened the employment situation in cities, and this is due to the loosening of internal migration constraints. Internal migration controls should thus be strengthened, they would argue.

Many cities have even taken measures to limit the kinds of jobs available to floaters. For example, since 1997, Beijing has had a policy controlling the size of the floating population. When the number of floaters exceeds this optimum (and it varies above and below three million), floaters are supposed to be sent back to their origin locations. The big cities of Guangzhou and Shanghai have addressed the problem a little differently. They have classified urban jobs into several categories, allowing floaters to fill only certain kinds, usually the unskilled or semi-skilled jobs, and/or the very low paying ones (Duan, 1999).

On the other hand, jobs taken by the floating population are usually those which urban residents are not always willing to take. They are very laborious and low paying positions often characterized by poor working conditions. Some Chinese hence argue that the floating population is not really competing with the permanent residents for jobs. For example, according to the 1997 Census of the Floating Population of Beijing, less than 1 percent of floaters were without jobs (Office of Leading Group, 1998; Poston and Duan, 1999).

Following Deng Xiaoping's rural economic reforms in the late 1970s, the Chinese government began in 1984 to implement a range of urban economic reforms. A major issue for the government was how to treat the long-standing policy of "full employment." Traditionally, urban jobs were viewed as features of the "Iron Rice Bowl"; urban workers never had to worry about being out of work; their rice bowl was thus unbreakable. However, when the government began to reform the urban economy, it informed the urban workers that the reforms could well break the "Iron Rice Bowl." In the mid-1980s

discussion began in China about whether unemployment could indeed occur in a socialist system.

In 1986 in Liaoning Province, there occurred the first official case in the entire country of a state-owned enterprise declaring bankruptcy. This resulted in several hundred workers losing their jobs. Since then, the Chinese have realized that unemployment is not an exclusive property of capitalist societies. They know now that socialist societies may also have unemployment; the “Iron Rice Bowl” can indeed be broken. Indeed, the “rice bowl” is now referred to as a “Mud Rice Bowl,” a term commonly used these days by urban workers and officials.

One reviewer of an earlier version of this paper asked if the bankruptcy in Liaoning was the first in China. There may well have been earlier instances of bankruptcy, but if so, they are unknown to the authors of this paper. We use the Liaoning example to show that bankruptcies of state-owned enterprises were first officially recognized by the government in the mid-1980s. Before that time, there were no officially declared bankruptcies of state-owned enterprises. Now, such bankruptcies will likely be a major source of unemployment, as is the case in capitalist societies.

Still, some Chinese will not recognize the obvious fact that China’s economy is increasingly taking on the characteristics of a capitalist economy. They note that China does not have a capitalist economy, but a socialist one with “Chinese characteristics.” The increasing presence of bankruptcies and urban unemployment, among other phenomena, however represents to us a definite move of China’s economy away from a strictly socialist one.

However, it has only been since the early 1990s that unemployment has really become a problem in China. By this we mean that before the mid-1980s, the government did not officially recognize the possibility or existence of unemployment in socialist China. Although after the mid-1980s its possibility was recognized, its levels were not high. They did not increase until the 1990s. Indeed in recent years millions of workers have lost their jobs because of factory closings or downsizing. Moreover, hundreds of thousands of young people are entering the labor force each year.

It is estimated that in China in 1998 there were about 12 million urban unemployed, representing an unemployment rate of almost 3 percent (*China News Digest*, 1998a). In 1998 alone, about 3 million state-owned enterprise workers became unemployed. And it is estimated that there will be an additional 3 million more unemployed workers in 1999 (*China News Digest*, 1998c). One Chinese official, Chen Qingtai, the Deputy Minister of the Economy and Trade, stated recently that in the coming three years, in order for China to be able to realize its goal of reforming the state-owned enterprises, about 4,000 large or middle sized enterprises will need either to declare bankruptcy or to merge with other firms, resulting in about 8 to 10 million state-owned enterprise workers either becoming unemployed or having to transfer their jobs (*China News Digest*, 1998b).

On the occasion of the May Day holiday (International Labor Day) in 1997, the *People's Daily* warned that China's unemployment rate could well reach unprecedented levels. More than two-thirds of the labor force in China's cities is employed in money-losing and heavily indebted state-owned enterprises, which are a legacy of the era of a rigid, centrally-planned economy. The *People's Daily* stated that these problems must be

resolved as soon as possible; the current employment system must change if China is to develop economically. The presence and potential for a large volume of urban unemployment have become a major concern of the Chinese government and its leaders.

However, to date there have been few studies of unemployment in urban China. Most investigations have been descriptive in nature, paying attention mainly to the incidence of unemployment and its projected levels in future years. Few analyses have examined the micro- and macro-based characteristics associated with the probability of being unemployed. Our multilevel investigation of non-agricultural unemployment in Beijing is an attempt to contribute to this gap.

### **Hypotheses, Methods and Data**

In our study we examine the factors influencing a person's probability of being unemployed. This is a particularly important problem these days in China. For one thing, unemployment in China appeared so suddenly and at such high levels of magnitude that neither the Chinese government nor its social science research community were prepared for it. The few studies dealing with unemployment in China are descriptive in nature, and, therefore have little basis for policy applications. Our proposed study of the determinants of unemployment would appear to be especially relevant.

We analyze the characteristics of the employed and unemployed resident populations of the Beijing Municipality drawing on data from the 1995 1 percent Population Sample Survey of China. With regard to the determinants of the likelihood of being unemployed, the micro characteristics of age, sex and education should be particularly influential. Many studies suggest that female workers are more likely to be

unemployed than male workers (Chang and Ding, 1999), and that age and educational attainment have differential impacts on the chances of being unemployed (Liu, 1997). It has also been shown that floaters are less likely to be unemployed due to their willingness to accept almost any kind of job (Poston and Duan, 1999). Let us consider these hypothesized associations in a little more detail.

Males more so than females are less likely to be unemployed. This owes in part to their, on average, higher levels of education and more specialized training. With regard to age, we hypothesize that the older the person, the less the probability of being unemployed. This expectation is based on the importance of seniority in China's urban economy. The country is just now moving towards a market-oriented economy. In the process of this transition, we hold that the government will place a premium on the seniority of its workers. Persons who have been working in urban factories and enterprises for a number of years, compared to those who have been employed for only a few years, will be less likely to be fired. The persons with the greatest amount of seniority will more often than not be the older workers.

We also hypothesize that the person's years of education will be negatively associated with the probability of being unemployed. This is a straightforward expectation based on the belief that the more human capital skills the person possesses, the less the likelihood he/she will be out of work.

Residents in the cities of China are either permanent or temporary. If permanent they hold household registrations (*hukous*) in the cities of their residence. If temporary their *hukous* are not in the cities but in the rural areas from which they migrated. Temporary migration is a large and pervasive phenomenon in Chinese cities; temporary

migrants, referred to by the Chinese as floating migrants, comprise as much as one-quarter of the populations of most of China's large cities. We hypothesize that if a person is a floater, he/she will have less of a likelihood of being unemployed. This expectation is based on the fact that floaters are typically willing to do most any kind of work. On the other hand, the permanent urban residents, i.e., the non-floaters, are much more selective about accepting jobs; indeed some would prefer being unemployed rather than accepting jobs which are extremely difficult or dirty, or ones in which working conditions are not good or the pay is not high. Permanent residents are usually economically better off than floaters and can afford to wait for the better job. Moreover, the government usually provides stipends to permanent residents who lose their jobs for the first few months of their unemployment.

In addition to these four micro-level characteristics of age, sex, educational attainment, and floater status, which we have hypothesized to be associated with the probability of being unemployed, we also expect that the likelihood of being unemployed will be associated with characteristics of the neighborhood or district in which the person lives. Massey and Denton (1994) have noted that "the structural organization of society ... plays a profound role in shaping the life chances of individuals. ... Structural characteristics affect the fate of large numbers of people and families who share common locations in the social order, ... [and] among the most important structural variables are those that are geographically defined" (1994:149)

The Beijing Municipality is comprised of ten districts and eight counties. The eight districts pretty much constitute the actual city, and the counties constitute the suburban and hinterland areas of the Municipality. These districts and counties, hereafter

referred to as regions or as neighborhood regions, vary tremendously in social class, occupational opportunities, and levels of industrialization. Presumably, persons living in those regions of Beijing of higher class standing and enhanced job opportunities will be less likely to be unemployed.

Specifically, we hypothesize that persons living in regions with high concentrations of workers with college education will have more of an opportunity for employment than those persons living in regions with low concentrations. There should be more opportunities for employment networking in areas with higher concentrations of workers with college training; thus these regions should have lower levels of unemployment.

We also hypothesize that persons living in regions with a diverse labor force should be less likely to be unemployed than persons living in regions with a restricted and narrowly based or concentrated labor force. Simply stated, regions with a more diversified labor force will offer more job opportunities to their residents than regions with a restricted labor force.

We are hypothesizing that an individual's likelihood of being unemployed will be influenced by both micro- and macro-level characteristics. The residents of Beijing are nested in a hierarchical structure of districts and counties, referred to here as neighborhood regions. Characteristics of the individuals and characteristics of their neighborhood regions are hypothesized to influence their likelihood of being unemployed. We discuss now the kinds of statistical techniques that could be used to take hierarchical structure into account.

Traditionally, there have been two obvious and elementary procedures, both of which have problems; one involves disaggregation, and the other involves aggregation. The first is to disaggregate all the regional level variables down to the level of the individuals. The problem with this approach is that if we know that persons are from the same region, then we also know that they have the same values on the various region characteristics. “Thus we cannot use the assumption of independence of observations that is basic for the use of classic statistical techniques” (de Leeuw, 1992: xiv) because persons are not randomly assigned to residential regions.

An alternative is to aggregate the individual-level characteristics up to the contextual level and to conduct the analysis at the aggregate level. In the case of our research, we could aggregate, i.e., average, the region-specific person characteristics on age, sex, education, floating status, and unemployment up to the region level of analysis and then conduct the analysis among neighborhood regions. The main problem here is that we would be discarding all the within-group (region), that is, individual, variation, which could well mean that much of the variation would be thrown away before the analysis begins. Often as a result, relations between the aggregate (region) variables are much stronger, and could well be different from their relationships at the individual level. Information is frequently wasted, and, moreover, the interpretation of the results could be distorted, if not fallacious, if we endeavored to interpret the aggregate relationship at the individual level (de Leeuw, 1992: xiv).

Therefore, in our research we use a multilevel model, specifically a hierarchical generalized linear model (HGLM) (Bryk et al., 1996), to assess the likelihood of non-agricultural unemployment of Beijing residents. The specific question we are able to

address with a multilevel model is to what extent do the human capital characteristics of the persons themselves, as well as the contextual characteristics of their neighborhoods, influence their likelihood of being unemployed (see also Bryk and Raudenbush, 1992).

Using HGLM we essentially undertake regressions of regressions. We first conduct a series of separate regressions of the likelihood of Beijing residents being unemployed, one regression for each of the 18 regions; these are referred to as level-1, or within-region, equations. Their intercepts and coefficients are then used as the dependent variables in a set of equations across the regions, referred to as level-2, or between-region, equations. This HGLM strategy produces “approximate empirical Bayes estimates of the randomly varying level-1 coefficients, generalized least squares estimators of the level-2 coefficients, and approximate restricted maximum-likelihood estimators of the variance and covariance parameters” (Bryk et al., 1996, p. 128).

The level-1 structural model is as follows:

$$n_{ij} = \log [ \phi_{ij} / 1 - \phi_{ij} ] = \beta_{0j} + \beta_{1j} (EDUC)_{ij} + \beta_{2j} (FLOAT)_{ij} + \beta_{3j} (AGE)_{ij} + \beta_{4j} (SEX)_{ij}$$

The level-2 structural model is as follows:

$$\beta_{0j} = \gamma_{00} + \gamma_{01} (COLL) + \gamma_{02} (MI) + u_{0j}$$

$$\beta_{1j} = \gamma_{10} + \gamma_{11} (COLL) + \gamma_{12} (MI) + u_{1j}$$

$$\beta_{2j} = \gamma_{20} + \gamma_{21} (COLL) + \gamma_{22} (MI) + u_{2j}$$

$$\beta_{3j} = \gamma_{30} + \gamma_{31} (COLL) + \gamma_{32} (MI) + u_{3j}$$

$$\beta_{4j} = \gamma_{40} + \gamma_{41} (COLL) + \gamma_{42} (MI) + u_{4j}$$

In the level-1 model,  $n_{ij}$  is the predicted log-odds of success, i.e., the logit of being unemployed; it may be converted to an odds by exponentiating its coefficient. It is being predicted by the individual's age (AGE), sex (SEX), years of schooling (EDUC) and whether or not the person is a floater (FLOAT).

In the level-2 model, each of the level-1 coefficients, i.e., the intercept and the four logistic regression coefficients are predicted by the level of college concentration (COLL) and the level of industrial diversification (M1) of the region. The level-2 equations are substituted into the level-1 equation and solved.

In our study we use data for the employed and unemployed resident populations of Beijing from the 1995 1% Population Sample Survey of China. We define the unemployed as those permanent and temporary urban residents (females aged 15 to 54, and males aged 15 to 59) who have never worked, or have lost their jobs, and are actively seeking non-agricultural employment; or are waiting for non-agricultural job placement. All agricultural workers residing in the Beijing Municipality are excluded. Also excluded are Beijing residents who are "formally registered in school," "housekeepers," "retired," or "disabled." Available for our analysis are 122,392 Beijing residents, of whom 5,670, or 4.6 percent, are unemployed.

Our dependent variable is the person's unemployment status, a dummy variable scored 1 if unemployed, and 0 if employed. A person is unemployed if he/she was not working during the one week period of September 24-30, 1995. Regarding the independent variables, education is measured by years of school completed. Age is the

worker's age in years. Sex is a dummy variable coded 1 if the person is male and 0 if female. If the person is a floating migrant, h/she is coded 1; if not, zero.

Table 1 presents descriptive data for our dependent and independent variables. Among the more than 122 thousand non-agricultural persons living in Beijing in 1995, five percent are unemployed. This population has an average age of about 35 years, with slightly more than eleven years of education. Six percent of them are floating migrants, and 56 percent are male.

TABLE 1 ABOUT HERE

As already mentioned, the Beijing Municipality is comprised of ten districts and eight counties. Across these eighteen regions, an average of 13 percent of their populations have completed at least some college, ranging from a low of 1 percent to a high of 38 percent. We hypothesize that the higher the level of college concentration in a region, the less its level of unemployment.

Industrial diversification is measured by the so-called M1 index of Gibbs and Poston (1975), as follows:  $M1 = 1 - [\sum X^2 / (\sum X)^2]$ , where X is the number of workers in any one industry. We use industrial data for each Beijing region for fifteen different industries, excluding agriculture. The highest possible value of M1 is 1.0, and the lowest value approaches zero; the lowest value of M1 would occur if all workers were in the same industry. Thus, the higher the M1 value for a region, the greater the degree of diversification of its labor force (Poston and Mao, 1998). Across the eighteen Beijing regions, the M1 measure has an average value of 0.8, and ranges from a low of 0.7 to a

high of 0.9. We hypothesize that the higher the level of industrial diversification in a region, the less its level of unemployment. We turn now to the results of our study.

## Results

Table 2 presents the results of the tests of the multilevel model presented in the previous section. We refer to each of the  $\gamma_x$  (gamma) coefficients and provide an interpretation. These  $\gamma_x$  coefficients may be interpreted in the same way as logit coefficients in a logistic regression. Also, they may be converted into odds ratios by exponentiating them.

### TABLE 2 ABOUT HERE

The  $\gamma_0$  coefficient is  $-2.90$   $t = -70.1$ . This is the intercept and is the grand mean of the expected log-odds of being unemployed. We can convert it into a “predicted probability” using the formula,  $1 / (1 + \exp \{- \text{predicted log-odds coefficient}\})$ . Since the level-1 and level-2 independent variables have been centered around their means, this probability of being unemployed refers to persons with average scores on the four micro-level variables, and living in regions with mean scores on the two macro-level variables. The predicted probability of being unemployed is .05 (that is, 5 percent), and is highly significant.

The  $\gamma_1$  coefficient is  $0.39$ ,  $t = 0.86$ . This is the main effect of the level-2 variable of college concentration on the mean unemployment rate of the regions. We hypothesized above that this effect should be negative. It is positive, but not significant. This means

that the proportion of college graduates in a neighborhood region does not have a significant effect on the individual's possibility of being unemployed.

The  $\gamma_{02}$  coefficient is -0.76,  $t = -0.84$ . This is the main effect of the level-2 variable of industrial diversification on the mean unemployment rate of the regions. We hypothesized that this effect should be negative. It is indeed negative, but not significant. This also suggests that the degree of industrial diversification of a region does not have a significant effect on the individual's probability of being unemployed.

The  $\gamma_{10}$  coefficient is -0.11,  $t = -12.25$ . This is the main effect of the individual's years of school on the probability of being unemployed. We hypothesized a negative effect. It is indeed negative and very significant. The greater the number of years of school, the less the likelihood of being unemployed. This result supports our level-1 hypothesis that increasing years of school decreases an individual's probability of being unemployed.

The  $\gamma_{11}$  coefficient is -0.14,  $t = -2.30$ . This is the cross-level interaction involving the college concentration variable on the coefficient of years of school and unemployment. This is a significant effect; it suggests that the greater the level of college concentration in a region, the less the relationship between years of school and unemployment.

The  $\gamma_{12}$  coefficient is -0.16,  $t = -0.65$ . This is the cross-level interaction involving industrial diversification on the coefficient of years of school and unemployment. The effect is not significant.

The  $\gamma_{20}$  coefficient is -1.12,  $t = -24.73$ . This is the main effect of the individual's floating status on the probability of being unemployed. We hypothesized a negative

effect. It is indeed negative and very significant. Floaters are less likely to be unemployed than permanent residents. Exponentiating this coefficient (that is,  $e^{-1.12}$ ) informs us that floaters are only about one-quarter as likely to be unemployed compared to non-floaters, i.e., the permanent residents of Beijing.

The  $\gamma_{21}$  coefficient is -2.32,  $t = -5.32$ . This is the cross-level interaction involving the college concentration variable on the coefficient of floater status and unemployment. This is a significant effect; it suggests that the greater the level of college concentration in a region, the less the association between floater status and unemployment.

The  $\gamma_{22}$  coefficient is 6.15,  $t = 10.35$ . This is the cross-level interaction involving industrial diversification on the association between floater status and unemployment. This too is a very significant effect and indicates that the greater the level of industrial diversification in a region, the higher the relationship between floater status and unemployment.

The  $\gamma_{30}$  coefficient is -0.06,  $t = -23.55$ . This is the main effect of the individual's age on the probability of being unemployed. We hypothesized a negative effect. It is indeed negative and highly significant. The older the person, the less likely he/she is to be unemployed.

The  $\gamma_{31}$  coefficient is 0.12,  $t = 3.90$ . This is the cross-level interaction involving the college concentration variable on the level-1 coefficient of age and unemployment. This too is a significant effect and indicates that the greater the level of college concentration in a region, the greater the association between age and unemployment.

The  $\gamma_{32}$  coefficient is -0.13,  $t = -2.05$ . This is the cross-level interaction involving industrial diversification on the level-1 relationship between age and unemployment. However, this effect is not statistically significant.

The  $\gamma_{40}$  coefficient is -0.01,  $t = -0.26$ . This is the main effect of the individual's sex on the probability of being unemployed. This effect is not significant. Our results indicate that there is no significant difference between males or females being unemployed. At least, this is the case in Beijing in 1995.

The  $\gamma_{41}$  coefficient is 1.01,  $t = 4.41$ . This is the cross-level interaction involving the college concentration variable on the association between sex and unemployment. This is a significant effect and indicates that the greater the level of college concentration in a region, the higher the association between sex and unemployment.

Finally, the  $\gamma_{42}$  coefficient is -1.70,  $t = -2.58$ . This is the cross-level interaction involving industrial diversification on the association between sex and unemployment. It indicates that the greater the degree of labor diversification in a region, the lower the association.

We consider now the implications of our research.

### **Implications and Discussion**

In this paper we have used a hierarchical generalized linear model (HGLM) to conduct a multilevel analysis of the likelihood for Beijing residents of being unemployed in the non-agricultural sector. The question we addressed was to what degree are characteristics of the persons themselves, and the characteristics of the Beijing neighborhood regions in which they live, influencing their likelihood in 1995 of being

unemployed. We examined the non-agricultural unemployment probabilities in 1995 of more than 122 thousand male and female residents of Beijing living in eighteen different neighborhoods of the municipality. We appraised the degree to which four individual-level, i.e., human capital, characteristics, namely, number of school years completed, whether or not the residents are floating migrants, and their age and gender, as well as two regional-level, i.e., structural, characteristics, namely, their region's level of concentration of persons with college experience, and level of industrial diversification, were related to the likelihood of the residents being unemployed.

At the individual level, we found that three of the micro-variables, namely, years of school completed, floating migrant status, and age were all strongly associated in a negative direction with the probability of being unemployed. Among the Beijing residents, persons with high levels of education, persons who were older, and persons who were floaters, were less likely to be unemployed than persons with less years of schooling, who were younger, and who were permanent residents. However, we found no significant direct effect of gender on the likelihood of being unemployed.

We hypothesized that among the regions of Beijing, those with high levels of college concentration and industrial diversification should report lower levels of unemployment. However, the effects of both these level-2 effects were not significant.

These insignificant relationships may be due to one or both of the following reasons. First, the 1995 data only collected unemployment information for urban residents and non-agricultural workers. In China, there is a much larger number of unemployed farmers than unemployed urban workers. However, information on the unemployed and under-employed farmers was not collected in the survey. So, the 1995 survey did not

provide a complete picture of unemployment in China. Were employment and unemployment information available for farmers, it is likely that we would have seen significant impacts of the structural characteristics upon the individual's likelihood of being unemployed.

Second, in this study, we have focused attention on the Beijing Municipality. Beijing is the capital and the political, educational, scientific and cultural center of China, and it is much more developed compared with most other provinces of China. Accordingly, there is not as much variation in the macro characteristics among Beijing's eighteen neighborhood regions as one might find in other areas.

Our use of a hierarchical generalized linear model, nevertheless, enabled us to measure the micro and macro relationships in much more precise ways, and in a more combined way, than would have been possible had we aggregated, or disaggregated our data, and then used multiple (logistic) regression. Let us now elaborate on this point, drawing on a similar commentary of Arnold (1992: 74-75).

In the first place, the HGLM approach allowed us produce for each region of Beijing a separate regression equation; the intercepts and logistic regression coefficients from these equations were then averaged across the regions and "weighted by the inverse of the standard error of each estimate" (Arnold 1992: 74). Thus the actual within-region associations were averaged, but the regression results from those regions that had more precise estimates tended to count more in the overall equation than the coefficients from regions with less precise estimates.

Secondly, the HGLM analysis enabled us to specify the degree of association between the within-region relationships and two (level-2) characteristics of the regions

themselves. Similar to the preceding, when we used HGLM to gauge the degree of association between region characteristics and unemployment, these estimates were weighted by the degree of precision of each region's mean unemployment likelihood estimate (Arnold 1992: 74).

Thirdly, our employment of HGLM permitted us to examine the influence of region characteristics on the education - unemployment associations, on the floater - unemployment associations, on the sex - unemployment associations, and on the age - unemployment associations. That is, we were able to ascertain the degree to which the level-2 variables of mean college concentration and industrial diversification influenced the individual-level associations between educational attainment and unemployment, between floating status and unemployment, between sex and unemployment, and between age and unemployment.

This third asset may well be the most important of the many advantages of multilevel modeling, at least in the context of our investigation of the influences of micro and macro variables on the likelihood of non-agricultural unemployment of Beijing residents. The level-2 characteristics themselves did not have much of a direct effect on the mean likelihood of being unemployed, but had sizable effects on the level-1 logistic regression coefficients of the four micro-level variables on unemployment. This means that there are important and very relevant human capital as well as social or cultural or regional capital effects on the likelihood of non-agricultural unemployment.

Both sets of findings from our analysis need to be considered by Beijing government officials. Too frequently, outcomes such as non-agricultural unemployment

are viewed as due mainly to individual-level factors. Our analysis indicates that while individual influences are indeed important, so too are regional-level influences.

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**Table 1.****Descriptive Statistics:****122,392 Residents of Beijing in 18 Neighborhood Regions, 1995**

Variable	N	Mean	SD	Minimum	Maximum
<u>Micro-level Variables</u>					
Unemployment	122,392	0.05	0.21	0.00	1.00
EDUC	122,392	11.18	3.07	0.00	16.0
FLOAT	122,392	0.06	0.24	0.00	1.00
AGE	122,392	34.9	9.56	15.0	59.0
SEX	122,392	0.56	0.50	0	1
<u>Macro-level Variables</u>					
COLL	18	0.13	0.13	0.01	0.38
M1	18	0.80	0.06	0.7	0.88

Source: Beijing 1% Population Survey, 1995.

**Table 2.****Effects (Gamma Coefficients) with Robust Standard Errors, of Individual and Regional****Characteristics on the Likelihood of Being Unemployed:****122,392 Residents of Beijing in 18 Neighborhood Regions, 1995**

Fixed Effect		Coefficient	Standard Error	T-ratio
Intercept	$\gamma_{00}$	-2.897	0.041	-70.143**
EDUC	$\gamma_{01}$	0.387	0.452	0.857
M1	$\gamma_{02}$	-0.755	0.903	-0.837
For Education slope,				
Intercept	$\gamma_{10}$	-0.112	0.009	-12.253**
EDUC	$\gamma_{11}$	-0.142	0.062	-2.297*
M1	$\gamma_{12}$	-0.157	0.243	-0.646
For FLOATING Migration slope,				
Intercept	$\gamma_{20}$	-1.122	0.045	-24.731**
EDUC	$\gamma_{21}$	-2.321	0.436	-5.318**
M1	$\gamma_{22}$	6.148	0.594	10.348**
For AGE slope,				
Intercept	$\gamma_{30}$	-0.063	0.003	-23.553**
EDUC	$\gamma_{31}$	0.119	0.031	3.897*
M1	$\gamma_{32}$	-0.133	0.065	-2.054
For SEX slope,				
Intercept	$\gamma_{40}$	-0.008	0.030	-0.255
EDUC	$\gamma_{41}$	1.007	0.228	4.412*
M1	$\gamma_{42}$	-1.695	0.657	-2.579*

\* P<0.05, \*\* p<0.01. Source: Beijing 1% Population Survey, 1995