



# PSC Research Reports

Report 13-809

November 2013

Zhuoni Zhang and Xiaogang Wu

Registration Status, Occupational  
Segregation, and Rural Migrants  
in Urban China

# Registration Status, Occupational Segregation, and Rural Migrants in Urban China

Zhuoni Zhang

Assistant Professor, Department of Applied Social Studies  
City University of Hong Kong

Xiaogang Wu

Professor, Division of Social Science  
Director, Center for Applied Social and Economic Research  
The Hong Kong University of Science and Technology

Population Studies Center Research Report 13-809  
November 2013

An earlier version of this paper was presented at the Spring Meeting of the International Sociological Association Research Committee on Social Stratification and Social Mobility (RC28), Beijing, China, May 13-16, 2009; and the American Sociological Association Annual Meeting, San Francisco, August 8-11, 2009. The authors would like to thank the Hong Kong Research Grants Council for financial support through “Consequences of Internal and Cross-border Migration in China for Children: A Mainland-Hong Kong Comparison” (GRF 646411), and comments from the conference participants as well as Donald Treiman (UCLA) and Yu Xie (University of Michigan, Ann Arbor). Xiaogang WU received a Prestigious Fellowship in Humanities and Social Science from University Grants Commission of Hong Kong (HKUST602-HSS-12) in 2013 to work on this paper. Direct all correspondence to Zhuoni Zhang ([zhuoni.zhang@cityu.edu.hk](mailto:zhuoni.zhang@cityu.edu.hk)), Dept. of Applied Social Studies, City University of Hong Kong, Tat Chee Avenue, Kowloon, Hong Kong SAR, or Xiaogang Wu ([sowu@ust.hk](mailto:sowu@ust.hk)), Center for Applied Social and Economic Research, The Hong Kong University of Science and Technology, Clear Water Bay, Kowloon, Hong Kong SAR.

## **Abstract**

This paper examines the sources of earnings disparities between rural migrants and local workers in urban China's labor markets, with special attention to the role played by the household registration (*hukou*) status in occupational segregation. Using data from the population mini-census of China in 2005, we show that rural migrants' earnings disadvantages are largely attributable to occupational segregation based on workers' *hukou* status, and the occupational segregation pattern varies by employment sector. Rural migrants who work in governmental agencies or state institutions earn less than their urban counterparts whereas those who work in public or private enterprises earn higher hourly wages. Our findings shed new lights on how government policies lead to occupational segregation and create inequality among different social groups.

## Introduction

Occupations have long been regarded central to stratification systems and social inequality in industrial societies (e.g., Blau and Duncan 1967; Mouw and Kalleberg 2010; Stolzenberg 1975). There are two underlying mechanisms through which occupations could affect earnings inequality. First, “occupational structure” plays a vital role in determining between-occupation economic differentials (Weeden, Kim, Di Carlo, and Grusky 2007). In this process, workers, based on their human capital characteristics, such as education, experience, occupation-specific skills, and other demographic characteristics, are assigned to different positions in the occupational structure and receive different levels of earnings. This between-occupation earnings inequality essentially reflects unequal “access” to differentially rewarding occupations among social groups. Second, within each occupation, workers may be paid unequally, resulting in within-occupation earnings inequality, which is distinct from inequality caused by the difference in occupational distribution. This process reflects the mechanism of how and based on what criteria people with jobs of similar nature and complexity are paid differentially.

These two mechanisms have been widely analyzed in research on earnings inequality among different social groups based on gender, race, and immigration status in western countries (Cohen and Huffman 2003; Grodsky and Pager 2001; Petersen and Morgan 1995). However, the distinctive roles played by the membership in these social groups in restricting access to occupational opportunities and differential pay within the same occupation remain subtle to a large extent for two reasons. On the one hand, the legal regulations in labor markets in developed countries prohibit open discrimination against certain groups solely on the basis of gender, race, or national origins. On the other hand, the differential access to certain occupations may have resulted from preferences among social groups. For example, women may prefer certain occupations over others. Therefore, the literature has focused mainly on pay penalty within specific occupations to infer the existence of wage discrimination—measured by the unexplained earnings gap after taking the individuals’ characteristics into account—against a disadvantaged group.

In the context of China, the household registration (*hukou*) system serves virtually as an administrative control of “access”. It controls both the migration of village farmers to cities and the job opportunities available to them once they get there. Whereas the first “access” control has been relaxed as regional economic inequality resulting in large-scale internal migration from inland villages to coastal cities, the second “access” hurdle evidently remains

a major issue in China's urban labor markets. While rural migrants are now allowed to work in urban areas, they are prohibited from entering higher-status occupations with better economic rewards and prestige, and tend to concentrate in physically demanding, low-skilled, and potentially hazardous sectors in which urban locals are reluctant to work (Knight, Song, and Jia 1999; Wang, Zuo, and Ruan 2002; Yang and Guo 1996).

Indeed, some city governments in China once have instituted various employment regulations to shield their local residents from having to compete with migrants (Knight, Song, and Jia 1999), especially since the mid-1990s when lay-offs by state-owned enterprises and unemployment became increasingly common in their cities. Slogans such as “urban workers prior to rural migrants, and local workers prior to non-local workers” have appeared (Cai, Du, and Wang 2001). The Beijing Municipal Government, for instance, has classified all occupations into three categories: those open to rural migrants with junior high school or above education, those from which rural migrants are excluded (which increased from 32 occupations in 1997 to 103 occupations in 2000), and those open to rural migrants only after hiring a certain proportion of laid-off urban workers (Xie 2007). Many other local governments choose to levy fees on the employers who hire migrants and on migrant workers for the mandatory issuance of identification and temporary registration cards (Chan and Zhang 1999) which takes months to process and costs hundreds of *yuan* (RMB) (Zhao 1999).

Whereas many previous studies have revealed the earnings disadvantages of rural migrants in urban labor markets and pointed to the institutional barriers associated with the *hukou* system in China (Knight, Song, and Jia 1999; Liang and Ma 2004; Wu 2009; Xie 2007), few have explicitly differentiated between the roles played by segregation and social exclusion on the basis of *hukou* status and by direct wage discrimination in the labor markets (but see Wu and Song 2010). Using data from a national representative survey conducted in 2005, this study contributes to the literature by explicitly examining how occupations moderate the link between the *hukou* system and earnings differentials between rural migrants and local urban workers in China. Specifically, we aim to identify through which mechanism—occupational segregation or unequal pay—the *hukou* system generates earnings inequality in China's urban labor markets by decomposing the earnings gap into two components—a between-occupation component and a within-occupation component, and comparing their relative contributions to the overall earnings inequality. We also perform propensity score matching analysis to directly examine the causal effect of *hukou* status on the earnings attainment of rural migrants.

## Background: Occupation, *Hukou* Status, and Rural Migrants' Earnings Disadvantages in Urban China

The economic reform in China since 1978 has not only brought phenomenal growth and prosperity to the country and its people but has also unleashed dynamic forces in many respects that had been suppressed during the first three decades of the communist rule. The government control on population migration has been weakened and geographic mobility, particularly from rural to urban areas, became much easier than before. The increase in the number of migrants without local household registration status (*hukou*) reflects fundamental social and demographic changes in Chinese society since the 1990s. The size of the “floating population”, which consists of migrants who have resided at the place of destination for at least six months without local household registration status, reached 144 million in 2000 (Liang and Ma 2004) and 147 million in 2006 (National Bureau of Statistics in China 2006). In other words, about 11 percent of China’s national population—predominantly rural farmers from inland areas—are on the move across counties for better economic opportunities in cities and coastal areas.

Although geographic mobility and employment change have become relatively easier than before, a sizable percentage of migrants continue to be denied the rights and benefits of citizenship simply because they do not have a local *hukou* (Liang 2004). The *hukou* system has served as an important administrative means for the state to deal with demographic pressures in the course of rapid industrialization since the 1950s (Wu and Treiman 2007). Under the *hukou* system, every Chinese citizen is assigned either an agricultural (rural) *hukou* or a non-agricultural (urban) *hukou* at birth, and people with a rural *hukou* are entitled to few of the rights and benefits that the state confers on urban residents, such as medical insurance, pensions, and educational opportunities for children. Nowadays, the system is still employed by the local government as a means of maintaining a large pool of cheap labor in the course of economic development (Hao 2012; Wu 2009), leading to the creation of a truly disadvantaged group in urban China (Zhang and Treiman 2012). Among all economic disadvantages faced by rural migrants, the earnings disparities between this group and urban local workers have received much attention from scholars and policy makers. According to a study based on the national data collected in 2006, rural migrants earn only 68 percent of what their urban counterparts earn, despite working 8 hours more each week (Li and Li 2007).

While scholars have typically linked rural migrants' earnings disadvantages to their lack of a local *hukou* in cities (Chan 1996; Wang 2005; Wang, Zuo, and Ruan 2002), they have not reached a consensus on how *hukou* status affects earnings inequality between rural migrants and urban residents. Inequality between those with a local urban *hukou* and those without may be derived from two sources: the differential access to high-paid jobs and the individual variability within the same job. Some scholars argue that, rural migrants are paid less mainly because they have poor productivity-related attributes, e.g., low education qualifications and lack of relevant working experience, limiting their chances of securing better-paid jobs (Wu 2009; Xie 2007; Yao 2001). Migrants are also prevented from access to certain occupations or work unit sectors of better economic rewards for their lack of a local *hukou* (Li 2006; Yao 2001). Indeed, if these individual and structural characteristics were taken into account, as some analysts have shown, rural migrants' earnings disadvantages in urban labor markets would significantly decrease or may even disappear (Li and Li 2007; Wu 2009).

Other researchers have suggested that the stigma of being without a local *hukou* ("a second-class citizen") may lead to unequal pay for rural migrants in urban labor markets, even though they hold similar jobs to urban workers. In this sense, the rural *hukou* directly leads to migrants' earnings disadvantages (Knight, Song, and Jia 1999; Meng and Zhang 2001). A study by Meng and Zhang (2001) revealed that a large proportion of the earnings gap between rural migrants and urban workers in Shanghai in the mid-1990s can be attributed to unequal pay within the same occupations, which cannot be explained by individuals' characteristics. This evidence is often cited to support the claim of direct wage discrimination against migrant workers in urban China.

Hence, the mechanisms of how *hukou* status affects earnings inequality between rural migrants and urban workers are portrayed differently in the two streams of literature mentioned above. The first mechanism can be referred to as the "segregation effect", where *hukou* status plays an indirect role and workers are sorted into different occupations and sectors based on their *hukou* status and other characteristics. Because rural migrants tend to concentrate in lower-paid occupations and sectors (Yang and Guo 1996), they earn less than urban workers on average. The other mechanism can be referred to as the "discrimination effect." In other words, employers tend to reward workers within the same occupation based on their *hukou* status, and the lack of an urban *hukou* status is the direct cause of rural migrants' earnings disadvantages in urban labor markets.

Between the two streams of the literature, scholars seem to have not paid sufficient attention to the role of occupation as important “reward packages” in shaping earnings inequality between rural migrants and urban workers (Grusky 2001). The two groups of workers are first sorted into distinct patterns of occupational distributions (Yang and Guo 1996) based on ascribed and acquired characteristics. The difference in occupational distribution, together with the differences in other characteristics, then shapes the earnings inequality between the two groups. A notable exception is the aforesaid study by Meng and Zhang (2001). They claimed that the earnings disadvantages of rural migrants’ were mainly caused by the *hukou* discrimination against them in urban labor markets.

Meng and Zhang’s conclusion, nevertheless, was only tentative because their empirical analyses were subject to several limitations. First, the data they analyzed were restricted to one city and the sample size was small. Moreover, and possibly because of the small sample size, they classified occupations into only four categories, which didn’t allow them to distinguish between the contribution of occupational segregation and that of wage discrimination within an occupation to earnings inequality. As a result, within-occupation earnings inequality, they claimed, was likely the differentials across occupations classified in a more detailed way. In addition, segregation between rural migrants and local workers takes place across employment sectors, but this they did not consider in their analysis. Most rural migrants work in the private sector as they have difficulties gaining access to jobs in the state sector, and even if they were able to find jobs in the state sector, they tend to be employed in low-end and temporary occupations (Li 2006). As both work units and occupation play important roles in determining urban earnings inequality in urban China (Lin and Bian 1991; Wu 2002), their effects should be simultaneously considered when examining job segregation and earnings inequality between rural migrants and urban locals.

In this study, we overcome all these limitations by taking advantage of the one-percent national population survey conducted in 2005, which recorded detailed information on occupation and for the first time also information on earnings, work unit sector and employment status. By employing a decomposition method, we are able to properly measure the effect of occupational segregation in different types of work units on earnings inequality between rural migrants and urban workers. The large sample size also allows us to remove the effects of different occupational distributions and individuals’ characteristics and use the propensity score matching method to assess the causal effect of rural migrant status on the earnings gap between the two groups.

## Data, Variables, and Methods

The 2005 one-percent population survey, also known as the population mini-census, was conducted by the National Bureau of Statistics of China. Unlike previous censuses and mini-censuses, the survey in 2005 collected information on respondents' earnings, employment status, work unit sector, working hours, and fringe benefits, in addition to *hukou* status, place of *hukou* registration, current place of residence, education and other demographic characteristics. We restrict our sample to the 119,675 adults aged between 16 and 60 who were residing in cities and towns at the time of survey for our analysis.

As the central interest of this study is to investigate earnings disparities between rural migrants and urban residents in labor markets, we define the key independent variable based on *hukou* registration status, the place of registration, and the place of residence. As Table 1 shows, some 30 percent of urban residents did not have *hukou* registration in the cities/townships where they lived. These people/residents are classified as migrants. Because of the complexity surrounding the definition of "urban" in China (Chan 2007), only around 60 percent of urban local residents actually held an urban *hukou*. Among migrants, 61 percent ( $=18.0/30.2$ ) came from rural areas and 60 percent ( $=[17.3+0.8]/30.2$ ) had a rural *hukou*. Nearly 95 percent ( $=17.3/18.3$ ) of migrants from rural areas held a rural *hukou*, and nearly 94 percent ( $=11.1/11.9$ ) of migrants from urban areas held an urban *hukou*.

The earnings differentials among the six groups are also presented in Table 1 (figures in parentheses): the average monthly earnings of local residents with a rural *hukou* were 550 *yuan*, only half of the earnings of local residents with an urban *hukou* (1,134 *yuan*); rural migrants from rural and urban areas earned 945 and 978 *yuan* per month, respectively, whereas the corresponding figures for urban migrants were 1,182 and 1,609 *yuan*, respectively. The results from group comparisons suggest that *hukou* status mattered more than where the migrants originated from in determining their earnings in urban labor markets. Thus our main interest is in comparing between migrant workers of rural *hukou* status and local residents of urban *hukou* status. In the following analysis, rural migrant workers refer to migrants with a rural *hukou*, and urban locals refer to local residents with an urban *hukou*.

Occupation and work unit are important independent variables in the analysis of earnings determination in China. In the mini-census, every occupation is given a two-digit code. There are 68 occupations in our sample. In the regression analysis of earnings attainment, we code occupations into five broad categories: managers, professionals, clerks, sales and service workers, and manual workers. We use a finer classification system to

capture the effect of occupational segregation in the decomposition and propensity score matching analyses.<sup>1</sup> Work units are coded into three categories: governmental agencies/state institutions, public enterprises, and private enterprises.

Education, gender, marital status, age, employment status, working hours per week, and county of residence are included as control variables. Education is broadly measured in three levels in the regression analysis: primary school or below, junior high school and senior high school or above. Very few rural migrants have attained education beyond senior high school. In the decomposition and propensity score matching analyses, education is measured in seven levels to better capture the differences between rural migrants and urban locals: illiterate, primary school, junior high school, senior high school, three-year college, four-year college, and graduate school.

Marital status is a dummy variable (coded 1 if married). A survey respondent may be self-employed, an employee, or an employer. This employment status information is coded as two dummies in the analysis. Age and working hours per week are continuous variables, and to capture their non-linear effects, we include the squared term of each.

Our dependent variable is monthly earnings, which is transformed into the natural logarithm in the regression analysis. In the following, we first present descriptive statistics for rural migrants and urban local workers and compare their labor market characteristics and earnings. We then employ linear regression models with county-level fixed effects to examine the earnings disparities between rural migrants and urban residents, taking into account their personal characteristics and structural positions in the labor markets. We then further decompose the earnings gap between rural migrants and urban local workers into two components: a within-occupation component and a between-occupation component, using the method proposed by Brown, Moon and Zoloth (1980). Finally, we employ propensity score matching methods to further identify the causal effect of *hukou* status on earnings attainment in urban China.

## **Descriptive Statistics**

Table 2 presents the descriptive statistics for rural migrants and urban local workers. Rural migrants were disadvantaged in many observed characteristics pertaining to earnings. Rural migrants had lower education than urban locals: only 18.5 percent of rural migrants, but 66.2 percent of urban locals, had received senior high school education or above. This is because most rural migrants were educated in rural areas, where educational opportunities are not as plentiful/available as in the cities (Wu 2012; Wu and Zhang 2010).

The distributions of occupation and work unit in Table 2 clearly show how rural migrants and urban local workers were segregated from each other in urban labor markets. Only 8.4 percent ( $=1.6+3.2+3.6$ ) of rural migrants, but 45.5 percent of urban locals, were employed as managers, professionals, and clerks. The segregation pattern is displayed in Fig. 1 which plots the distribution of occupations sorted according to the International Socio-economic Index of occupational status (ISEI) (Ganzeboom and Treiman 1996), with a higher ISEI score representing a higher-status occupation. About one-third of urban locals had occupations with ISEI scores lower than 40, one third with scores between 40 and 60, and one third with scores over 60. However, most rural migrant workers had occupations with ISEI scores lower than 50. They were particularly concentrated at the lower end of the distribution.

The contrast between rural migrants and urban locals is even more obvious in terms of work units. Only 1.5 percent of rural migrants were employed in governmental agencies/state institutions<sup>2</sup> and 9 percent in public enterprises, whereas 61.8 percent ( $=27.4+34.4$ ) of urban locals were employed in these types of work units. Rural migrants were more likely to be self-employed as they had more difficulties in finding regular jobs in the cities (Li 2006). Rural migrants were younger, and a lower percentage of them were married than urban locals. Their working hours were much longer than those of urban locals.

Our main interest in this study is earnings inequality between rural migrants and urban locals. As Table 3 shows, on average, urban locals earned 1,169 *yuan* per month but rural migrants earned 968 *yuan* per month, 17 percent ( $=1-968/1169$ ) less than urban locals. Two-sample t-test shows that the difference is statistically significant ( $p<.001$ ). The gap would be even more substantial if we take into account the fact that rural migrants worked 10 hours longer per week (shown in Table 2) than urban locals, with much less benefits. The earnings gap also varied across different work units: rural migrants earned 36 percent less than urban locals in governmental agencies/state institutions, 13 percent less in public enterprises and 8 percent less in private enterprises.

The earnings disadvantages of rural migrants that we have observed could have been due to their lack of urban local status, but could also have been due to their difference from urban workers in the characteristics pertaining to earnings, such as education level and experience. To clarify this, we now turn to the multivariate analyses.

## Empirical Findings

### *Results from Regression Analysis*

Table 4 presents estimated coefficients for county-level-fixed-effect regression models of earnings attainment. Model 1 shows that, even after controlling for the effects of gender, marital status, education, age and its squared term, rural migrants still earned a significant 11.2 percent ( $=1 - e^{-0.119}$ ) less than urban workers. In Model 2, after occupation, employment status and working hours are added to the equation, the earnings gap decreases to 7.4 percent ( $=1 - e^{-0.077}$ ), but continues to be statistically significant. Model 3 further includes work units, which sees the gap decreasing to 5.3 percent ( $=1 - e^{-0.054}$ ). These results suggest that the observed earnings differential between rural migrants and urban workers cannot be completely explained by their differences in personal characteristics, such as human capital, occupations, and working conditions.

The effects of other independent variables are just as expected: other things being equal, women earned less than men; those who were married earned more than those who weren't married; people of higher education earned more. The effects of both age and working hours on earnings are curvilinear, first increasing and then declining. Compared with manual workers, managers, professionals, and clerks tended to earn more, but sales and service workers tended to earn less. Employers earned more than the self-employed, but employees earned less than the self-employed. Workers in public and private enterprises earned significantly less than those who worked in governmental agencies/state institutions.

In Model 4, we allow the effect of rural migrant status to vary across different work unit sectors by including interaction terms between migration status and work units. Confirming the results in Table 3, the multivariate analysis shows that the earnings gap between rural migrants and urban local workers was the largest in governmental agencies/state institutions, smaller in public enterprises and the smallest in private enterprises. Rural migrants earned 36.2 percent less ( $=1 - e^{-0.450}$ ) than their urban counterparts in governmental agencies/state institutions, 9.3 percent less ( $=1 - e^{-0.450+0.352}$ ) in public enterprises, and only 3 percent less ( $=1 - e^{-0.450+0.420}$ ) in private enterprises, controlling for other factors.

These findings are surprising to some extent. It seems that rural migrants faced more earnings disadvantages in government agencies/institutions which have long cherished socialist egalitarian ideology than in public and private enterprises. There may be two possible explanations. First, rural migrants' disadvantages may have resulted from employers' preferences and differential treatments towards them in different types of work units. In private enterprises and to some extent in public enterprise that put more emphasis on

economic efficiency, skills and merits count more than *hukou* status, which is an institutional legacy associated with socialist redistributive economies (Wu 2009). Second, both migrants and local workers may differ in personal characteristics (e.g., education, work experience, and occupation) across work units. As previously shown in Table 2, only 1.5 percent and 9 percent of rural migrants respectively worked in governmental agencies/state institutions and public enterprises, whereas over 60 percent of urban locals worked in these two sectors. Moreover, rural migrants in governmental agencies/state institutions and public enterprises tended to concentrate in low-status jobs, with most being security workers, post/telecom workers, storage employees, catering service workers, etc. Hence, segregations by work unit and occupation seem to be an important source of earnings disparities between rural migrants and local workers.

To confirm this speculation, we compute the segregation index, also called the dissimilarity index (Duncan and Duncan 1955), to measure the difference in occupational distribution between rural migrants and urban workers.<sup>3</sup> Overall, around 45 percent of rural migrants in the full sample would have to move to different occupations to produce a distribution that is as even as that of urban workers. The corresponding percentages are 57 percent in governmental agencies/state institutions, 42 percent in public enterprises, and 32 percent in private enterprises. These figures suggest that the two groups concerned were most segregated in government agency/state institutions and the least segregated in private enterprises.

How did the occupational segregation affect earnings between the two groups? Figure 2 presents the proportion of rural migrants and the average monthly earnings of each occupation sorted by their ISEI scores. The three lines show the fitted values by the *lowess* procedure in STATA. With the increase in occupational ISEI score, the percentage of rural migrants decreases substantially from over a half to below 10 percent. In other words, low-status occupations were dominated by rural migrants, whereas high-status occupations were mostly taken by urban locals. Noticeably, urban workers earned more than rural migrants on average in occupations with ISEI scores higher than 30. In contrast, rural migrants earned more than urban workers in occupations with ISEI scores lower than 30.

These observed patterns, together with results from regression models, suggest occupational segregation to be an important mechanism in creating the overall earnings inequality between rural migrants and urban locals. To demonstrate this empirically, in the next section, we employ a decomposition method to disentangle within- and between-occupation earnings disparities between the two groups.

### Results from Decomposition Analysis

Two decomposition methods have been widely adopted in previous studies of occupational segregation and earnings inequality. While the Blinder-Oaxaca decomposition method treats occupation as a productivity-related characteristic and assumes that coefficients in earnings equation do not vary across occupations (Blinder 1973; Oaxaca 1973), Brown, Moon and Zoloth (1980) proposed a decomposition method in which occupation is treated as an intervening variable and earnings equation coefficients are allowed to vary across occupations (hereafter the Brown et al. method). Given the particular research interests of this study, we adopt the latter to assess the relative contributions of within- and between-occupation earnings differentials to the overall earnings inequality between rural migrants and urban locals.

The Brown et al. decomposition method also estimates the hypothetical occupational distribution and hypothetical earnings attainment within each occupation for the segregated group members concerned (rural migrants in this case) as if they were treated the same as their counterparts (urban locals in this case) in occupational and earnings attainment equations. As a result, the within- and between-occupation earnings variations can each be further divided into two parts: (1) the part that can be explained by differences in observable characteristics included in the equations (hereafter referred to as “explained”), and (2) the part that comes from differences in coefficients in the occupational and earnings attainment equations (hereafter referred to as “unexplained”). The earnings differentials between urban locals and rural migrants thus can be decomposed as

$$\begin{aligned}
\bar{W}^U - \bar{W}^R &= \sum_j (P_j^U \bar{W}_j^U - P_j^R \bar{W}_j^R) \\
&= \sum_j (P_j^R \bar{W}_j^U - P_j^R \bar{W}_j^R + P_j^U \bar{W}_j^U - P_j^R \bar{W}_j^U) \\
&= \sum_j P_j^R (\bar{W}_j^U - \bar{W}_j^R) + \sum_j \bar{W}_j^U (P_j^U - P_j^R) \\
&= \underbrace{\sum_j P_j^R \hat{\beta}_j^U (\bar{X}_j^U - \bar{X}_j^R)}_{(1)} + \underbrace{\sum_j P_j^R \bar{X}_j^R (\hat{\beta}_j^U - \hat{\beta}_j^R)}_{(2)} \\
&\quad + \underbrace{\sum_j \bar{W}_j^U (P_j^U - \hat{P}_j^R)}_{(3)} + \underbrace{\sum_j \bar{W}_j^U (\hat{P}_j^R - P_j^R)}_{(4)} \tag{Eq. 1},
\end{aligned}$$

where superscripts  $U$  and  $R$  respectively refer to urban locals and rural migrants, and subscript  $j$  refers to the  $j$ th occupation category.  $\bar{W}^U$  and  $\bar{W}^R$  denote, respectively, the mean logarithm of monthly earnings of urban locals and rural migrants for the entire sample, and  $\bar{W}_j^U$  and  $\bar{W}_j^R$  are the mean logarithm of monthly earnings of urban locals and rural migrants within each occupation  $j$ .  $\bar{X}_j^U$  and  $\bar{X}_j^R$  are mean values of the personal characteristics of each group in occupation  $j$ .  $\hat{\beta}_j^U$  and  $\hat{\beta}_j^R$  are the estimated coefficients of personal attributes in two separate earnings equations for occupation  $j$ .  $P_j^U$  and  $P_j^R$  are the observed proportions of each group in occupation  $j$ .  $\hat{P}_j^R$  refers to the hypothetical proportion of rural migrants who would be in occupation  $j$  if they were treated as urban locals in the occupational attainment equation.<sup>4</sup>

As mentioned, due to the small sample size for some occupations, we collapse occupations into 38 categories (here  $j=1, 2, 3, \dots, 38$ ). Within each category, to obtain  $\hat{\beta}_j^U$  and  $\hat{\beta}_j^R$ , we estimate earnings equations for urban workers and rural migrants, with gender, marital status, education, employment status, work unit, age and its squared term, and working hours and its squared term as the independent variables. To generate the hypothetical occupational distribution of rural migrants,  $\hat{P}_j^R$ , we first develop a multinomial logit model of occupational attainment for urban workers based on a set of independent variables, including gender, marital status, education, and age and its squared term, and then predict the occupational distribution of rural migrants using the estimated equation for urban workers. Based on the results obtained by following the above procedures, we decompose the overall logarithm of the monthly earnings gap between urban workers and rural migrants ( $\bar{W}^U - \bar{W}^R$ ) into four different parts. Table 5 presents the decomposition results.

Similar to the results in Table 4, urban workers earned about 12 percent more ( $=e^{0.117}-1$ ) than rural migrants, which is made up of the within-occupation earnings gap (-0.083) and the between-occupation earnings gap (0.200). The negative within-occupation differential suggests that rural migrants indeed earned more than urban workers within the same occupation, while the positive between-occupation differential indicates that urban workers earned more because on average they had occupations with higher pay. The occupational segregation effect more than offset rural migrants' advantages of within-occupation pay, leading to rural migrants' overall earnings disadvantage relative to urban workers.

Moreover, rural migrants' within-occupation earnings advantages resulted from an unexplained component (-0.134), rather than the differences in observable attributes between the two groups. In other words, the fact that rural migrants earned more than urban locals within the same occupation was mainly due to some unobservable characteristics that cannot be captured by the independent variables in the models. In contrast, the between-occupation earnings gap was largely caused by the differences in observed characteristics between the two groups: 77 percent of the between-occupation differential can be explained by the chosen independent variables. The positive *total explained* (0.204) and the negative *total unexplained* (-0.087) components of the earnings gap suggest that urban workers earned more than rural migrants on average mainly because they enjoyed advantages in observed characteristics positively associated with earnings.

Hence, the decomposition results in Table 5 clearly show that rural migrants' earnings disadvantages relative to urban workers were mainly attributable to the occupational segregation in urban labor markets. In other words, they earned less because they were less likely than urban local workers to have access to high-paid jobs. Furthermore, occupational segregation was highly related to rural migrants' disadvantages in observed characteristics, such as education, gender, marital status, and age, among which education, we believe, was one of the most important factors, and the result of the imbalanced educational opportunity structures between rural and urban sectors.

### ***The Propensity Score Matching Analysis***

The decomposition results above suggest that, on the one hand, occupational segregation was the main source of migrants' earnings disadvantages relative to urban local workers, and on the other hand, such restrictive access to occupations with higher pay can be explained mainly by the migrants' observable characteristics. The question is, to what extent *hukou* per se plays a role in occupational segregation and in creating earnings inequality? In other words, did the rural migrant status have a causal effect on earnings in urban China? In this section, we conduct a propensity score matching analysis to address this issue explicitly.

The key feature of the propensity score matching method is that it allows researchers to summarize all the differences between the two groups under comparison (treated and control groups) with a single dimension: the propensity score, which is the conditional probability of receiving the treatment given the observed covariates (Rosenbaum 2002: 296). A large body of literature has shown that the propensity score matching method can remove a great deal of

bias attributable to observed covariates in causal inference (e.g., Morgan and Winship 2007; Xie and Wu 2005).

The strategy is to first stratify the propensity scores, then match the treated and control groups across the propensity score strata, and finally use the difference in mean outcomes in the matched samples within each stratum to obtain an estimate of the average treatment effect on the treated (DiPrete and Gangl 2004).

Here, we define rural migrants as the treated group and urban locals as the control group. The observed covariates include ISEI scores, employment status, years of schooling (converted from educational categories), age, gender, marital status, type of work unit, and county of residence. We use hourly wage as the outcome variable because we cannot use working hours as a covariate in the propensity score matching analysis, as it is not a pre-treatment characteristic. As the effect of migrant status was found to vary across different work units in the OLS regression analysis, we conduct propensity score matching by the type of work unit.

To perform the matching analysis, we first obtain the propensity score using a binary logit model, in which the dependent variable is whether one is a rural migrant or not and independent variables include education, ISEI score, employment status, county of residence, and other demographic characteristics. We then match the rural migrants and urban local workers based on their propensity scores using one-to-one nearest-neighbor caliper matching with replacement.<sup>5</sup> Finally, we evaluate the causal effect of rural migrant status by comparing the mean hourly wage between rural migrants and urban local workers.<sup>6</sup>

Table 6 presents the results based on the matched samples of rural migrants (treated group) and urban workers (control group) for the full sample and by work unit. The average treatment effect on the treated (ATT) is presented in Column 3. The average treatment effect is positive and statistically significant in the full sample, suggesting that, given the two groups within the same propensity scores of having a rural *hukou* status, rural migrants indeed earned 0.43 *yuan* per hour more than urban workers on average. The difference can be interpreted as the causal effect of rural *hukou* (migrant) status on earnings per hour.

The causal effect of rural migrant status varies by work unit. Consistent with the substantive findings from regression analysis, in government agencies/state institutions, the average treatment effect is negative, suggesting that rural migrants earned 0.97 *yuan* per hour less than urban workers. Even if we rule out the effect of occupational segregation in the government agencies/state institutions, and match rural migrants to comparable urban local workers, rural migrants still faced a significant earnings disadvantage. However, in both

public and private enterprises, the average treatment effect turned out to be positive and significant. On average, rural migrant workers earned 0.42 *yuan* and 0.55 *yuan* per hour more than urban workers in public and private enterprises, respectively. Assuming both rural migrants and urban local workers worked 55 hours per week, rural migrants earned 92 ( $=0.42*55*4$ ) *yuan* and 121 ( $=0.55*55*4$ ) *yuan* per month more than urban locals in public and private enterprises, respectively.

To be certain, the results estimated above rely on the assumption that there is no unobserved systematic difference between the treated and control groups, known as the ignorability assumption. To check whether or not our estimation may be subject to potential selection bias on unobservable characteristics (or hidden bias), we implement the Rosenbaum bounds sensitivity analysis (Rosenbaum 2002: 105-170), and conclude that our results are quite robust. It is very unlikely that the estimates are biased due to the omitted difference in unobservable characteristics between the two groups (see details in Appendix Table A2).

These findings surprisingly contradict what we have observed in descriptive statistics in Table 5 and regression results in Table 6, which show that rural migrants earned less than urban locals also in both public and private enterprises, but are consistent with the previous findings in the decomposition analysis: that rural migrants' earnings disadvantages were mainly attributable to occupational segregation, which were offset by their earnings advantages within the same occupation. By removing more bias attributable to observable characteristics other than occupation, the propensity score matching analysis provides even stronger evidence to the claim that rural migrants' overall disadvantages were caused by occupational structural barriers, rather than by the employers' discrimination against them in urban labor markets.

## Conclusions and Discussions

The unprecedented waves of rural migrants arriving in urban areas since the 1990s have not only fundamentally transformed the landscape of Chinese societies but also bear far-reaching implications for the evolution of the nation's social structure in the long term. While the governmental controls over population migration through the household registration (*hukou*) system have faded away and the majority of rural migrants have been able to achieve upward socioeconomic mobility from farming, the effect of the *hukou* system continues to be lingering in urban China's labor markets. Compared to local workers, rural migrants are significantly disadvantaged, both economically and socially, in Chinese cities. To foster the

social and economic integration of rural migrants in cities, it is crucial to understand the mechanisms and process of how the inequality between migrants and local residents is generated.

Against this context, based on the analysis of sample data from the population mini-census of China conducted in 2005, we examine the commonly observed earnings inequality between rural migrants and urban local workers and adjudicate between two competing explanations for the sources of rural migrants' earnings disadvantages: occupational segregation and wage discrimination in urban China's labor markets. Multivariate linear regression analyses confirm that rural migrants earn significantly less than their urban counterparts, with this earnings disadvantage being the greatest in government/state institutions, followed by public enterprises, and finally the private sector (also see Wu and Song 2010). We attribute the inequality pattern to the variant occupational segregation across work unit sectors. The occupational segregation between rural migrants and urban workers, measured by the dissimilarity index, is more prominent in the government agencies/state institutions than in public enterprises and private enterprises. Even though rural migrants are able to enter government agencies/state institutions, they end up in low-end and unskilled jobs.

The decomposition analysis using more fine-tuned occupational categories allows us to separate the between-occupation and within-occupation earnings differentials, and shows that the earnings inequality between rural migrants and urban locals is largely attributable to between-occupation earnings differentials rather than to unequal pay within each occupation. Moreover, between-occupation earnings inequality can be explained by the difference between the two groups in observed covariates, particularly education. Hence, we conclude that the earnings disadvantages of rural migrants result mainly from occupational segregation in urban labor markets.

The propensity score matching analysis moved a further step to show that, after being matched with their urban counterparts based on chosen observed attributes (i.e., after a great deal of bias attributable to observed characteristics between the two groups was removed), rural migrants surprisingly enjoy advantages in hourly wages over urban local workers, and only in governmental agencies/state institutions do their disadvantages persist. These results, in sharp contrast to the findings from the group comparisons and multivariate regression analyses, provide stronger evidence to support the claim that the rural migrants' overall earnings disadvantage is derived from the occupational segregation rather than within-occupation wage discrimination against them by employers.

Why do rural migrants enjoy higher earnings than urban locals within the same occupation in public and private enterprises? One explanation is that rural migrants are positively selected. According to the “healthy migrant hypothesis,” young and healthy people are more likely to migrate (Lu 2008); and when rural migrants have a serious health problem, they often return home to rural areas (Chen 2011). Therefore, rural migrants on average are healthier than their urban local counterparts. Moreover, other unobserved attributes of rural migrants that are positively associated with earnings may also provide explanations. For instance, migrants may be more ambitious and willing to work harder to improve their living conditions. Finally, migrants without local *hukou* are more likely to be compensated with more cash earnings but fewer benefits than local workers, therefore, rural migrants’ earnings advantages in both public and private enterprises may be overestimated and their disadvantages in government/state institutions may be underestimated.

Our findings bear important implications for policies tackling the problems related to rural migrants’ socioeconomic inclusions in Chinese cities. Because unequal pay (wage discrimination) against rural migrants seem to play a minimum role in generating earnings inequality between rural migrants and urban local workers, policies and public efforts should be made to reduce occupational segregation and remove other structural barriers, to help rural migrants gain equal access to a variety of occupations, especially good ones, in urban China’s labor market. Not incidentally, on February 23rd, 2012, the State Council of China issued a policy notice calling for proactive and stable reform of China’s household registration system (Hu 2012), stating that all new employment, education and skills training policies must not be linked to the *hukou*, and migrants in county-level cities could apply for local *hukou*. How such policy changes would affect the patterns of occupational segregation and economic disparities between migrants and local workers remains to be investigated.

## Endnotes

- <sup>1</sup> Due to the small sample size for some of the original 68 categories, we collapse occupations into 38 categories in the decomposition analysis.
- <sup>2</sup> Among these migrant workers, most were teachers/teaching staff, security workers, post/telecom workers, storage employees, or catering service workers.
- <sup>3</sup> The index of dissimilarity refers to the percentage of rural migrants that would have to move to different occupations to produce a distribution that is the same as that of urban locals. The basic formula is  $\frac{1}{2} \sum_{j=1}^N \left| \frac{r_j}{R} - \frac{u_j}{U} \right|$
- where  $r_j$  = the rural migrant population in the  $j$ th occupational category,  
 $R$  = the total rural migrant population in the sample,  
 $u_j$  = the urban local population in the  $j$ th occupational category,  
 $U$  = the total urban local population in the sample, and  
 $N$  = the total number of occupations.
- <sup>4</sup> Here, we treat urban local workers as the reference group and assume that rural migrants are treated discriminatorily.
- <sup>5</sup> Nearest-neighbor matching constructs the counterfactual for each treated case using the control cases that are closest to the treated case in propensity score. A caliper is used to avoid very poor matches in treatment cases that may occur in nearest-neighbor matching by restricting matches to some maximum distance (Morgan and Winship 2007: 107-108). We set the caliper size to 0.025, which restricts matches to within 2.5 percentage points of propensity scores from the treated case. We also impose a common support to drop treatment observations whose propensity score is higher than the maximum or less than the minimum propensity score of the controls.
- <sup>6</sup> Other basic matching algorithms include exact matching, interval matching, and kernel matching (Morgan and Winship 2007: 107-109). Results are substantively identical to those that use alternative matching algorithms.

## References

- Blau, Peter M. and Otis Dudley Duncan. 1967. *The American Occupational Structure*. New York: Wiley.
- Blinder, Alan S. 1973. "Wage Discrimination: Reduced Form and Structural Estimates." *Journal of Human Resources* 8:436-455.
- Brown, R. S., M. Moon, and B. S. Zoloth. 1980. "Incorporating Occupational Attainment in Studies of Male-Female Earnings Differentials." *Journal of Human Resources* 15:3-28.
- Cai, Fang, Yang Du, and Meiyang Wang. 2001. "Household Registration System and Labor Market Protection." *Economic Research Journal [in Chinese]*.
- Chan, Kam Wing. 1996. "Post-Mao China: A Two-Class Urban Society in the Making." *International Journal of Urban and Regional Research* 20:134.
- Chan, Kam Wing. 2007. "Misconceptions and Complexities in the Study of China's Cities: Definitions, Statistics, and Implications." *Eurasian Geography and Economics* 48:383-412.
- Chan, Kam Wing and Li Zhang. 1999. "The Hukou System and Rural-Urban Migration in China: Processes and Changes." *The China Quarterly* 260:818-855.
- Chen, Juan. 2011. "Internal Migration and Health: Re-Examining the Healthy Migrant Phenomenon in China." *Social Science & Medicine* 72:1294-1301.
- Cohen, Philip N. and Matt L. Huffman. 2003. "Occupational Segregation and the Devaluation of Women's Work across U.S. Labor Markets." *Social Forces* 81:881.
- DiPrete, Thomas A. and Markus Gangl. 2004. "Assessing Bias in the Estimation of Causal Effects: Rosenbaum Bounds on Matching Estimators and Instrumental Variables Estimation with Imperfect Instruments." *Sociological Methodology* 34:271-310.
- Duncan, Otis D. and Beverly Duncan. 1955. "A Methodological Analysis of Segregation Indexes." *American Sociological Review* 20:210-217.
- Ganzeboom, Harry B. G. and Donald J. Treiman. 1996. "Internationally Comparable Measures of Occupational Status for the 1988 International Standard Classification." *Social Science Research* 25:201-239.
- Grodsky, Eric and Devah Pager. 2001. "The Structure of Disadvantage: Individual and Occupational Determinants of the Black-White Wage Gap." *American Sociological Review* 66:542-567.
- Grusky, David B. 2001. *Social Stratification :Class, Race, and Gender in Sociological Perspective*, vol. 2. Boulder, Colo.: Westview Press.
- Hao, Lingxin. 2012. "Cumulative Causation of Rural Migration and Initial Peri-Urbanization in China." *Chinese Sociological Review*. Forthcoming.
- Hu, Shuli. 2012. "Complexities of Hukou Reform Must Not Deter China from Pressing Ahead." *South China Morning Post* May 8th, 2012.
- Knight, John, Lina Song, and Huaibin Jia. 1999. "Chinese Rural Migrants in Urban Enterprises: Three Perspectives." *Journal of Development Studies* 35:73 - 104.
- Li, Chunling. 2006. "Non-Institutional Paths of Migrants' Status Attainment: Migrant Labors and Non-Migrant Labors in Comparison." *Sociological Studies [in Chinese]*.
- Li, Peilin and Wei Li. 2007. "Migrant Workers' Economic Status and Social Attitude in the Transition of China." *Sociological Studies [in Chinese]*.
- Liang, Zai. 2004. "Patterns of Migration and Occupational Attainment in Contemporary China: 1985-1990." *Development and Society* 33:251-274.
- Liang, Zai and Zhongdong Ma. 2004. "China's Floating Population: New Evidence from the 2000 Census." *Population and Development Review* 30:467-488.
- Lin, Nan and Yanjie Bian. 1991. "Getting Ahead in Urban China." *The American Journal of Sociology* 97:657-688.

- Lu, Yao. 2008. "Test of the 'Healthy Migrant Hypothesis': A Longitudinal Analysis of Health Selectivity of Internal Migration in Indonesia." *Social Science & Medicine* 67:1331-1339.
- Meng, Xin and Junsen Zhang. 2001. "The Two-Tier Labor Market in Urban China: Occupational Segregation and Wage Differentials between Urban Residents and Rural Migrants in Shanghai." *Journal of Comparative Economics* 29:485-504.
- Morgan, Stephen L. and Christopher Winship. 2007. *Counterfactuals and Causal Inference*. New York: Cambridge University Press.
- Mouw, T. and A. Kalleberg. 2010. "Occupations and the Structure of Wage Inequality in the United States, 1980s to 2000s." *American Sociological Review* 75:402-431.
- National Bureau of Statistics in China. 2006. *Report on 2005 National One Percent Population Sample Survey (2005 年全国1%人口抽样调查主要数据公报)*. [http://www.stats.gov.cn/tjgb/rkpcgb/qgrkpcgb/t20060316\\_402310923.htm](http://www.stats.gov.cn/tjgb/rkpcgb/qgrkpcgb/t20060316_402310923.htm). Accessed 11 June, 2011.
- Oaxaca, Ronald L. 1973. "Male-Female Wage Differentials in Urban Labor Markets." *International Economic Review* 14:693-709.
- Petersen, Trond and Laurie A. Morgan. 1995. "Separate and Unequal: Occupation-Establishment Sex Segregation and the Gender Wage Gap." *The American Journal of Sociology* 101:329-365.
- Rosenbaum, Paul R. 2002. *Observational Studies*. New York: Springer.
- Stolzenberg, Ross M. 1975. "Occupations, Labor Markets and the Process of Wage Attainment." *American Sociological Review* 40:645-665.
- Wang, Fei-Ling. 2005. *Organizing through Division and Exclusion: China's Hukou System*. California: Stanford University Press.
- Wang, Feng, Xuejin Zuo, and Danching Ruan. 2002. "Rural Migrants in Shanghai: Living under the Shadow of Socialism." *The International Migration Review* 36:520-545.
- Weeden, Kim A., Young-Mi Kim, Matthew Di Carlo, and David B. Grusky. 2007. "Social Class and Earnings Inequality." *The American Behavioral Scientist* 50:702.
- Wu, Xiaogang. 2002. "Work Units and Income Inequality: The Effect of Market Transition in Urban China." *Social Forces* 80:1069-1099.
- Wu, Xiaogang. 2009. "Household Registration, Social Exclusion, and Rural Migrants in Chinese Cities." in *Socialist China, Capitalist China: Social-Political Conflicts under Globalization*, edited by G. Wu and H. Lansdowne. Routledge.
- Wu, Xiaogang. 2012. "The Household Registration System and Rural-Urban Educational Inequality in China." *Chinese Sociological Review* 44:31-51.
- Wu, Xiaogang and Donald J. Treiman. 2007. "Inequality and Equality under Chinese Socialism: The Hukou System and Intergenerational Occupational Mobility." *American Journal of Sociology* 113:415-445.
- Wu, Xiaogang and Xi Song. 2010. "Ethnicity, Migration, and Social Stratification in China: Evidence from Xinjiang Uyghur Autonomous Region." Paper presented in International Sociological Association-Research Committee on Social Stratification and Mobility (RC28) in Haifa, Israel, May 9-11, 2010.
- Wu, Xiaogang and Zhuoni Zhang. 2010. "Changes in Educational Inequality in China, 1990-2005: Evidence from the Population Census Data." *Research in Sociology of Education* 17:123-152.
- Xie, Guihua. 2007. "Rural Migrant Workers and Urban Labor Markets." *Sociological Studies* [In Chinese].
- Xie, Yu and Xiaogang Wu. 2005. "Market Premium, Social Process, and Statisticism." *American Sociological Review* 70:865-870.
- Yang, Quanhe and Fei Guo. 1996. "Occupational Attainments of Rural to Urban Temporary Economic Migrants in China, 1985-1990." *International Migration Review* 30:771-787.

- Yao, Yang. 2001. *Social Exclusion and Economic Discrimination: The Status of Migrations in China's Coastal Rural Area*. Working paper E2001005, China Center for Economic Research, Peking University.
- Zhang, Zhuoni and Donald J. Treiman. 2012. "Social Origins, Hukou Conversion, and the Wellbeing of Urban Residents in Contemporary China." *Social Science Research* Forthcoming.
- Zhao, Yaohui. 1999. "Labor Migration and Earnings Differences: The Case of Rural China." *Economic Development and Cultural Change* 47:767-782.

**Table 1.** Urban Population by Migrant Status and *Hukou* Characteristics, China 2005 (Aged 16-60)

	Migrants		Local Residents
	<u><i>Hukou</i> registration place</u>		
	<u>Rural areas</u>	<u>Urban areas</u>	
<u><i>Hukou</i> status</u>			
Rural <i>hukou</i>	17.3% (945)	0.8% (978)	27.3% (550)
Urban <i>hukou</i>	1.0% (1182)	11.1% (1609)	42.6% (1134)
Subtotal	18.3%	11.9%	
Total	30.2%		69.9%

*Note:* N= 119,675. All percentages are cell percentages of the total population (aged 16-60). Average monthly earnings are reported in parentheses (unit: RMB), calculated based on the working population who reported their earnings (the corresponding frequencies from left to right for the first and second rows are: 16349, 617, 24988, and 826, 8709, 30206).

**Table 2.** Descriptive Statistics of Rural Migrants and Local Workers in Urban China, 2005 (Aged 16-60)

	Rural Migrants	Urban Locals
Education		
Primary school and below	19.6	4.7
Junior high school	61.9	29.1
Senior high school and above	18.5	66.2
Occupation		
Manager	1.6	4.9
Professional	3.2	24.7
Clerk	3.6	15.9
Sales & service worker	34.9	26.4
Manual worker	56.7	28.1
Employment Status		
Employee	78.8	85.1
Employer	4.3	3.5
Self-employed	16.9	11.4
Work Unit		
Governmental agencies/state institutions	1.5	27.4
Public enterprises	9.0	34.4
Private enterprises	89.6	38.2
Female	41.5	40.9
Married	62.7	85.0
Age	30.2	38.0
	(9.4)	(9.1)
Working hours per week	55.2	45.8
	(13.2)	(10.4)
N	15996	28661

*Note:* Percentages are presented for categorical variables, and means and standard deviations are presented for continuous variables.

**Table 3.** Average Monthly Earnings by Work Unit Type in Urban China, 2005 (Rural Migrants and Urban Locals, Aged 16-60)

	Rural migrants (R)	Urban locals (U)	Ratio (R/U)
Governmental agencies/state institutions	846 (500)	1329 (852)	0.64
Public enterprises	1022 (576)	1172 (910)	0.87
Private enterprises	965 (754)	1052 (1295)	0.92
Full sample	968 (737)	1169 (1066)	0.83
T-test for full sample	Pr( $T_R < T_U$ ) = 0.0000		
N	15996	28661	

*Note:* Unit of outcome is RMB; standard deviations are in parentheses.

**Table 4.** Determinants of Logged Monthly Earnings in Urban China, 2005 (County-level Fixed Effects Models, Aged 16-60)

Dependent variable: log (monthly earnings)	1	2	3	4
Rural migrants	-0.119** (0.007)	-0.077** (0.007)	-0.054** (0.007)	-0.450** (0.033)
Female	-0.205** (0.005)	-0.197** (0.005)	-0.195** (0.005)	-0.195** (0.005)
Married	0.083** (0.009)	0.068** (0.009)	0.060** (0.009)	0.059** (0.009)
Education ( primary and below [omitted])				
Junior high school	0.176** (0.009)	0.161** (0.008)	0.158** (0.008)	0.158** (0.008)
Senior high school and above	0.487** (0.009)	0.379** (0.009)	0.360** (0.009)	0.358** (0.009)
Age	0.024** (0.002)	0.024** (0.002)	0.023** (0.002)	0.024** (0.002)
Age <sup>2</sup> × 100	-0.028** (0.003)	-0.029** (0.003)	-0.030** (0.003)	-0.029** (0.003)
Occupation (manual workers [omitted])				
Manager		0.423** (0.013)	0.390** (0.013)	0.389** (0.013)
Professional		0.273** (0.008)	0.213** (0.008)	0.210** (0.008)
Clerk		0.166** (0.008)	0.104** (0.009)	0.103** (0.009)
Sales & service worker		-0.078** (0.006)	-0.077** (0.006)	-0.073** (0.006)
Employment status (self-employed[omitted])				
Employee		-0.017* (0.008)	-0.067** (0.008)	-0.069** (0.008)
Employer		0.289** (0.014)	0.297** (0.014)	0.300** (0.014)
Work Unit (governmental/state institutions [omitted])				
Public enterprises			-0.121** (0.008)	-0.130** (0.008)
Private enterprises			-0.217** (0.009)	-0.247** (0.009)
Interactions				0.352** (0.035)
Public enterprises× Rural migrants				0.420** (0.033)
Private enterprises× Rural migrants				
Working hours		0.003** (0.001)	0.005** (0.001)	0.006** (0.001)
Working hour <sup>2</sup> × 100		-0.003** (0.001)	-0.004** (0.001)	-0.004** (0.001)
Constant	6.089** (0.036)	6.009** (0.048)	6.188** (0.049)	6.194** (0.048)
N	44,657	44,657	44,657	44,657
R <sup>2</sup>	0.186	0.251	0.262	0.265
Number of counties	2,418	2,418	2,418	2,418

Note: Standard errors are in parentheses. \* p<0.05; \*\* p<0.01 (two-tailed tests).

**Table 5.** Decomposition Results of Earnings Differentials between Local Workers and Rural Migrants in Urban China, 2005 <sup>a</sup>

	Log monthly earnings	% of subtotal
Total earnings differential <sup>b</sup>	0.1174	
Within-occupation	-0.0826	100
Explained	0.0510	-62
unexplained	-0.1336	162
Between-occupation	0.2000	100
Explained	0.1534	77
unexplained	0.0466	23
Total explained	0.2044	
Total unexplained	-0.0870	

*Note:*

<sup>a</sup> Results of this table are calculated using Brown et al. (1980) decomposition method. Please refer to the text for details.

<sup>b</sup> = urban workers' average logged earnings minus rural migrant workers' average logged earnings.

**Table 6.** Propensity Score Matching Results of Hourly Income by Type of Work Unit in Urban China, 2005 (Rural Migrants and Urban Locals, Aged 16-60)

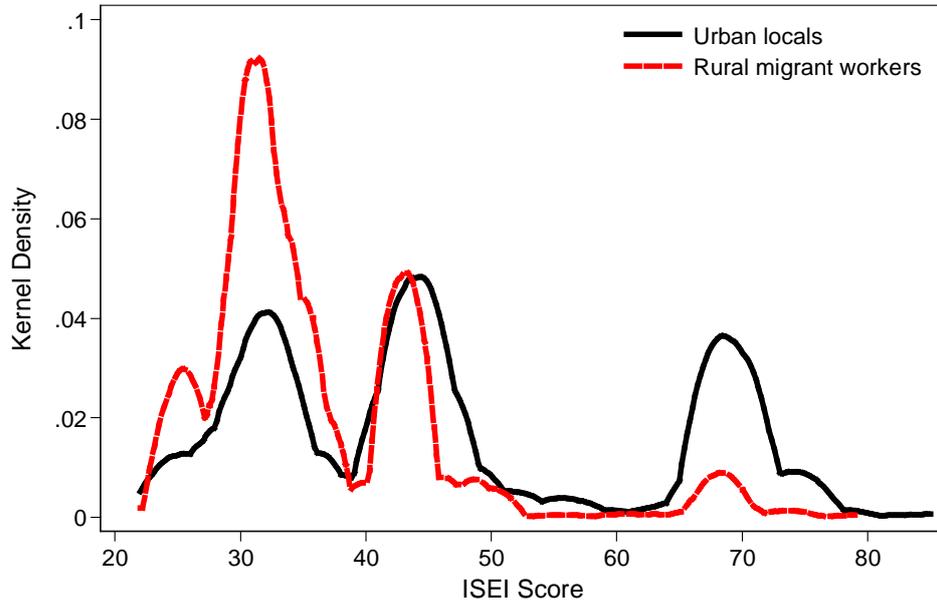
	Treated (rural migrants) (T)	Controls (urban locals) (C)	ATT <sup>a</sup> : (T)-(C)	N: rural migrants	N: urban locals	% common support <sup>b</sup>
Full sample	4.66	4.23	0.43 <sup>***</sup>	15996	28661	99.99
Governmental agencies/state institutions	4.67	5.64	-0.97 <sup>**</sup>	233	7856	94.85
Public enterprises	5.44	5.02	0.42 <sup>***</sup>	1433	9862	99.16
Private enterprises	4.59	4.04	0.55 <sup>***</sup>	14330	10943	99.98

*Note:* Unit of hourly wage is RMB. \*\* p<0.01; \*\*\* p<0.001 (two-tailed tests).

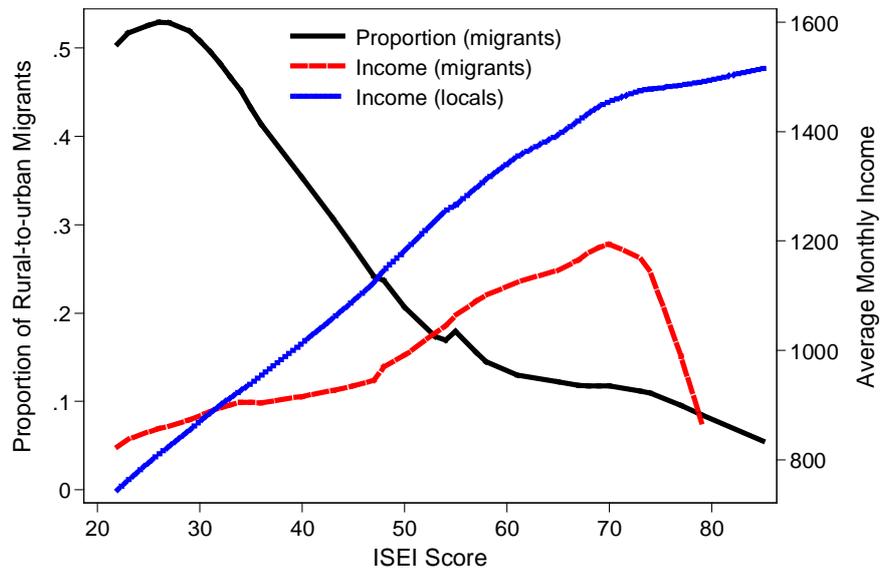
<sup>a</sup> ATT is the average treatment effect on the treated.

<sup>b</sup> The percentage of treated observations whose propensity score is no higher than the maximum or no less than the minimum propensity score of the controls.

**Figure 1.** Kernel Densities of ISEI Scores for Urban Local and Rural Migrant Workers in China, 2005



**Figure 2.** Proportion of Rural Migrant Workers, and Average Monthly Earnings of Rural Migrants and Urban Locals in China, 2005



*Note:* The three lines show the fitted values by the *lowess* procedure in *stata*; the unit of monthly earnings is RMB. The larger the ISEI score, the higher the occupation status. Refer to appendix Table A1 for the occupation titles corresponding to the ISEI score.

## Appendices

Table A1. Chinese Standard Classification of Occupations and Converted ISEI Scores

Chinese code	Occupation title	ISCO88	ISEI	Collapsed classification: 38 categories	Broad classification: 5 categories
1	Heads of party organizations	1141	58		
2	Heads of government organizations	1120	77		
3	Heads of democratic party and other social organizations	1141	58	1	1
4	Heads of state institutions	1200	68		
5	Heads of enterprises	1200	68		
11	Social science, etc. professionals	2440	65		
12	Physical, mathematical, & engineering science professionals	2100	69	2	
13	Architects, engineering, etc. professionals	2140	73		
14	Electronics & telecommunications engineers	2144	68	3	
15	Mechanical engineers	2145	67		
16	Other architects, engineering, etc.	2149	69		
17	Agronomists, etc. professionals	2213	79		
18	Ship & aircraft controllers & technicians	3140	57	4	2
19	Health professionals	2224	74		
21	Business professionals	2410	69		
22	Finance and sales associate professionals	3410	55	5	
23	Legal professionals	2420	85		
24	Teaching professionals	2300	69	6	
25	Writers & creative or performing artists	2450	61		
26	Athletes sportspersons, etc. associate professionals	3475	54		
27	Authors, journalists & other writers	2451	65	7	
28	Religious professionals	2460	53		
29	Other professionals and technicians	2000	70		
31	Administrative staff	4100	45	8	
32	Protective services workers	5160	47	9	
33	Postal and telecommunications staff	4210	48		3
39	Other clerical and related staff	4000	45	10	
41	Salespersons	5200	43	11	
42	Material-recoding & transport clerks	4130	36	12	
43	Housekeeping & restaurant services workers	5120	32	13	
44	Hotels, travel and fitness entertainment service workers	5132	25	14	4
45	Transport conductors	5112	34	15	
46	Health supporting service workers	5130	25	18	
47	Social and community service workers	5132	25	16	
48	Service workers	5132	25	17	
49	Other service workers	5000	40	18	

**Table A1.** Chinese Standard Classification of Occupations and Converted ISEI Scores (Cont')

Chinese code	Occupation title	ISCO88	ISEI	Collapsed classification: 38 categories	Broad classification: 5 categories
61	Mining, quarrying, exploring, well drilling and salt mining workers	7110	50	19	
62	Metal smelting and processing workers	8120	30	20	
63		8120	30		
64	Chemical workers	8150	35	21	
65		8150	35		
66	Mechanical manufacturing workers	7210	31	22	
67		8200	32		
68	Machine tool installers	8280	31	23	
69		7230	34		
71	Machine repairing workers	7230	34	24	
72	Electronic equipment installing repairing, assembling & Electrical wiremen	7240	40	25	
73	Installers, repairers, & assemblers of electrical equipment	8283	34	26	
74	Rubber and plastic products manufacturing workers	8230	30	27	
75	Textile workers	8260	30	28	
76	Tailors and sewers	7430	36	29	
77	Food and beverage production workers	8270	29		
78	Tobacco preparers and tobacco product makers	8279	29	30	
79	Medical production worker	8221	30		5
81	Wood and related processors & product makers, Paper and paper product manufacturing workers	8140	27	31	
82	Building material production workers	8290	26	32	
83	Glass, ceramic and enamel product makers	8130	22	33	
84	Radio & TV equipment operators & cinema projectionists	3132	57	34	
85	Printing and related workers	7340	40		
86	Arts and handicrafts production worker	7300	34		35
87	Stationary and sports goods production workers	7400	33		
88		7120	30		
89	Construction workers	7230	34	36	
90	Transportation equipment operators	8300	32		
91		8300	32		
92	Environmental monitoring and waste management personnel	9160	23	37	
93	Inspection, measuring, and analysis staff	3150	50		
99	Other production, transportation, and related workers	8000	31	38	

Note: Only occupations appearing in our sample are shown.

**Table A2.** Rosenbaum Bounds for the Treatment Effect of Rural Migrant Status

	$\Gamma$	p-critical	Hidden bias equivalent to	
			Experience (year)	ISEI score
Full Sample	1.00	<.0001	0	0
	1.05	<.0001	-0.5	-2
	1.10	<.0001	-1.0	-4
	1.15	<.0001	-1.5	-6
	1.20	<.0001	-1.9	-8
	1.25	<.0001	-2.3	-10
	1.30	<.0001	-2.7	-12
	1.35	0.001	-3.1	-13
	1.40	0.131	-3.5	-15
Governmental agencies/state institutions	1.00	<.0001	0.0	0
	1.05	0.002	-0.5	-1
	1.10	0.005	-1.0	-3
	1.15	0.012	-1.5	-4
	1.20	0.023	-2.0	-5
	1.25	0.042	-2.4	-6
	1.30	0.07	-2.8	-8
	1.35	0.109	-3.2	-9
Public enterprises	1.00	<.0001	0.0	0
	1.05	<.001	-0.4	-2
	1.10	0.010	-0.8	-3
	1.15	0.053	-1.2	-5
	1.20	0.177	-1.6	-6
Private enterprises	1.00	<.0001	0.0	0
	1.05	<.0001	-0.5	-2
	1.10	<.0001	-1.0	-5
	1.15	<.0001	-1.5	-7
	1.20	<.0001	-2.0	-9
	1.25	<.0001	-2.4	-11
	1.30	<.0001	-2.8	-13
	1.35	<.0001	-3.3	-15
	1.40	<.0001	-3.6	-17
	1.45	0.009	-4.0	-19
	1.50	0.255	-4.4	-21

*Note:* The procedure for the sensitivity analysis is as follows. First, we set the level of hidden bias to a certain value  $\Gamma$ , assuming that conditional on observed covariates, individuals differ in their odds of receiving the treatment by as much as a factor of  $\Gamma$  because of the unobservable characteristics. When  $\Gamma = 1$ , no hidden bias exists; If  $\Gamma = 1.5$ , for two groups with the same observed characteristics, the odds of receiving the treatment for one group would be 50% higher than for the other group. For each hypothetical  $\Gamma$ , we then calculate an interval of p-values, reflecting the uncertainty due to hidden bias, and report the p-critical value, based on which we determine the value of  $\Gamma$  at which we would have to question our estimated treatment effect. Finally, we equate the magnitude of hidden bias associated with specific levels of  $\Gamma$  in terms of the equivalent effects of experience (measured by age) and the occupation ISEI score, using the coefficients of these covariates in the logit models predicting the propensity scores ( $\ln(\Gamma) / \beta_x$ ) (for more details, see Rosenbaum 2002). To cast doubt on our estimation, an unobserved covariate would have to increase the odds ratio of treatment by around 40% for the full sample, 35% for the government/institution subsample, 20% for the public enterprise subsample, and 50% for the private enterprise subsample. Moreover, the effect of such an unobserved covariate should also be strong enough (almost perfect) to determine hourly wages (Rosenbaum 2002: 111). We deem the threshold very high and it is unlikely that such a covariate exists.



# PSC Research Reports

The **Population Studies Center** (PSC) at the University of Michigan is one of the oldest population centers in the United States. Established in 1961 with a grant from the Ford Foundation, the Center has a rich history as the main workplace for an interdisciplinary community of scholars in the field of population studies.

Currently PSC is one of five centers within the University of Michigan's Institute for Social Research. The Center receives core funding from both the Eunice Kennedy Shriver National Institute of Child Health and Human Development (R24) and the National Institute on Aging (P30).

PSC Research Reports are **prepublication working papers** that report on current demographic research conducted by PSC-affiliated researchers. These papers are written for timely dissemination and are often later submitted for publication in scholarly journals.

The **PSC Research Report Series** was initiated in 1981.

**Copyrights for all Reports are held by the authors.** Readers may quote from this work (except as limited by authors) if they properly acknowledge the authors and the PSC Series and do not alter the original work.

Population Studies Center  
University of Michigan  
Institute for Social Research  
PO Box 1248, Ann Arbor, MI 48106-1248 USA  
[www.psc.isr.umich.edu](http://www.psc.isr.umich.edu)