RIETI Discussion Paper Series 15-E-142

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http://www.rieti.go.jp/en/

RIETI Discussion Paper Series 15-E-142
December 2015

Labor Market and the Native-Immigrant Wage Gap: Evidence from urban China[1]

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Abstract

By developing a model based on recent wage theories, we examine workers' wage determination, considering not only human-capital related factors but also the labor market. We also consider the price level using a city-specific consumer price index. Data come from a national survey in China, while unlike previous studies that examine temporary rural–urban migrants in China, we concentrate on permanent rural migrants who have obtained an urban household registration. We find that considering the effects of the labor market is important in examining workers' wage determination. The decomposition result shows that different effects of market tightness and unemployment benefits are the two primary reasons for the wage differential between the two groups, whereas education does not contribute to the wage gap. As a policy implication, our results indicate that supporting the workers' ability to adapt to the labor markets could reduce wage inequality.

Keywords: Wage determination, Human capital, Labor market tightness, Unemployment benefits
JEL classification: J3, J7, R1

[1] This study is a part of research results undertaken at RIETI. The authors are grateful to Akira Kawaguchi, Hiromi Ishizuka, Masahisa Fujita, Masayuki Morikawa, Fumio Ohtake, Masaru Sasaki, and participants at annual meetings of Japanese Economic Association and Japanese Association for Chinese Economy and Management Studies, and RIETI Discussion Paper Seminar, for their helpful comments. Data analyzed in this study were collected by the research project "China General Social Survey," which was carried out by the Department of Sociology, Renmin University of China and Social Science Division, Hong Kong Science and Technology University, directed by Dr. Li Lulu and Dr. Bian Yanjie, and sponsored by the China Social Science Foundation. The authors appreciate the assistance in providing data by the aforementioned institutes and individuals. The views expressed herein are the authors' own.

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1. Introduction

In recent years, China has experienced large-scale rural-urban migration. Substantial literature has examined rural *hukou* migrants in urban areas, i.e., rural migrants working in cities and who are not recognized as official urban residents by China's unique household registration system, *hukou* (e.g., Zhao, 2005; Messinis, 2013). However, the literature largely ignores the rural migrants who have obtained urban *hukou* status and reside permanently in cities. They are not a subgroup within the rural *hukou* migrants because their migration route differs from that of the rural *hukou* migrants. They experience less discrimination and can be as well educated as the urban-born residents. However, their urban experience, family backgrounds, and access to urban labor markets might greatly differ from urban-born residents. Unlike studies that pay attention to rural *hukou* migrants, our study focuses on rural migrants who have obtained urban *hukou* status, defined as permanent rural migrants, and examines their wage gap relative to urban-born workers.

Further, empirical work on wage inequality has mostly concentrated on the workers' personal characteristics (e.g., Lee, 2012; Meng & Zhang, 2001; Tao Yang & Zhou, 1999) and devotes little attention to labor market effects. To extend examination of wage inequality in urban China beyond human capital to the entire wage determination process involving workers, firms, and labor market factors, we develop a model based on human capital theory and search–matching–bargaining theory.

Because China's urban labor market is highly imperfect (Knight & Song, 2005; Liu, 2013), wages usually depart from the theoretical point of equilibrium in traditional supply–demand approaches. The search–matching–bargaining theory helps to resolve this problem by modeling wage determination in a Nash bargaining framework. Wage is determined by the maximization of the workers' and firms' returns from participation in the labor market, given labor market tightness (the ratio of job vacancies to job seekers), labor productivity, bargaining power, and other factors. This theoretical background underpins our estimation.

Furthermore, we apply a developed version of Blinder–Oaxaca decomposition (Blinder, 1973; Oaxaca, 1973) to study wage differences in China. Unlike previous studies that attribute the entire unexplained part of the Blinder–Oaxaca decomposition result to discrimination (e.g., Meng & Zhang, 2001), we investigate the unexplained part to examine the details of wage inequality between the

permanent rural migrants and original residents.

Moreover, China's high inflation has deeply affected nominal wages. Prices, especially housing costs, differ greatly across cities, and ignoring price could generate misunderstanding of wage levels. For instance, the price-adjusted value of 5,000 yuan per month in nominal earnings differs substantially between Beijing and nearby Tianjin or Shijiazhuang. The average housing cost per square meter in 2007 was 10,661 yuan in Beijing, 5,576 yuan in Tianjin, and 2,378 yuan in Shijiazhuang. On the other hand, a wage gap based on nominal wage could be overestimated. Examining U.S. real wages, Moretti (2013) deflates nominal wages using a central measure of housing cost that accommodated price differences across metropolitan areas, finding that the increase in utility differences between skilled and unskilled workers was smaller than previously thought based on nominal wage differences. Similar to the study by Moretti (2013), this study also employs a housing cost index to examine regional price differences.

We find that human capital and labor market factors significantly affect wage determination in China and that the wage gap between permanent rural migrants and urban natives is significant. However, labor market tightness and unemployment benefits, rather than education, primarily determine the wage gap.

In the remaining of this paper, Section 2 offers the background of this study. Section 3 describes its theoretical model, and Section 4 discusses data. Section 5 estimates wage determination using samples of each labor group and the whole sample. Decomposition analysis of the wage gap is given in Section 6. Section 7 concludes the study.

2. Background

China's permanent rural–urban migrants differ from rural–urban migrants who do not possess an urban *hukou* (*nongmingong*). The background involves a lengthy history of strict limitations on rural-born workers migrating to China's cities. City welfare and good job opportunities are usually limited to workers who have been granted urban *hukou* status, and workers who do not possess such status often receive unequal treatment (Zhao, 2005; Meng, 2012). Previous studies attribute the wage gap between rural *hukou* migrants and urban residents to the migrants' lesser education and work experience, as also to *hukou* discrimination (Lee, 2012; Liu, 2013b). However, in recent years, a

large number of rural-born residents have obtained urban *hukou* because the system grants permanent city *hukou* to some highly-skilled, rural-born persons, educated at highly-ranked universities, who have acquired skilled urban employment. Also, some rural Chinese obtain urban *hukou* by joining the army, and others obtain *hukou* by virtue of living in areas absorbed into nearby cities during urbanization. Moreover, some cities grant urban *hukou* to the spouses (born in rural areas) of skilled urban workers (CGSS 2008).

Persons who were born in rural areas and granted urban *hukou* later in life have been able to reside permanently in cities and receive city welfare benefits akin to city-born workers. However, their urban residency is usually briefer than original urban residents of similar ages; further, their parents and relatives live in rural areas, and, therefore, their social networks are constricted compared with those of the original residents. These factors could affect their employment and wages, leading to discrimination.

Characteristics of permanent rural migrants in our study differ from the customarily studied temporary rural migrants with rural *hukou*. Temporary migrants find it difficult to obtain urban *hukou* (Zhao, 2005). Most rural migrants granted urban *hukou* are not temporary migrants but arrived via other migratory routes such as attending an urban university and obtaining skilled employment. They are usually better educated than temporary rural migrants and often acquire similar jobs as held by urban-born workers. Thus, permanent rural migrants in our study differ from rural *hukou* temporary migrants.

Moreover, although Chinese labor markets have developed greatly since the pre-1980s planned economy, they remain characterized by imperfect information and extensive worker–job matching frictions (Knight & Song, 2005; Liu, 2013). Accessibility to labor markets and job information have been important in determining wages. For instance, Knight and Yueh (2003) find that social networks (measured by the number of relatives, friends, colleagues, and acquaintances) contribute to the workers' income in urban China. To allow imperfect information in labor market modeling, the search and matching theory was developed, the framework of which was determined by decentralized trade between workers and firms against the backdrop of an imperfect labor market (Pissarides, 2000). Thus, search and matching theory is the theoretical background in this study.

3. Model

Assume the production function is homogenous of degree 1 and follows a Cobb-Douglas form considering labor efficiency, *A* (Cahun & Zylberberg, 2004).[3]

$$Y = K^{\alpha}(AL)^{1-\alpha}, \quad 0 < \alpha < 1. \tag{1}$$

An employed worker's productivity, *p*, defined by $y \equiv Y/L$, is obtained as follows:

$$y = k^{\alpha} A^{1-\alpha} \quad , \tag{2}$$

where $k = K/L$. Because investment in human capital raises productivity (Becker, 1993), we assume A is determined by each worker's human capital as follows:

$$A = A(edu, tenu, tenu^2), \tag{3}$$

where *A* increases with *edu* and *tenu* and decreases with the square of *tenu*.

In each period, the number of new worker-firm matches is determined by the matching function as $M = \mu(v, su)$, where v is the number of vacant jobs, u is the number of unemployed workers, and *M* is the new hires, which strictly increase in both arguments, are twice-differentiable, strictly concave, and homogeneous of degree one. In addition, s is search intensity, which captures the situation wherein workers with wider social networks and better job information can adopt numerous,

[3] Our study ignores technological progress in the production function because of data limitations.

varied job-search methods, intensifying their search intensity. Adopting these assumptions, we show that the rate at which vacant jobs are filled, *M/V*, is $q(\theta)$, where q is a decreasing function of θ. Similarly, the rate at which unemployed workers find jobs, *M/U*, is given by $s\theta q(\theta)$.

The discounted present value of the expected income stream of an unemployed worker, U, satisfies the following Bellman equation:

$$rU = z + s\theta q(W - U), \tag{4}$$

where z is the instantaneous utility of an unemployed worker (what we subsequently call "unemployment benefits"), and W is the real discounted present value of an employed worker's expected income stream.

The discounted present value for employed worker , W , is obtained by the following Bellman equation:

$$rW = w + \lambda(U - W), \tag{5}$$

where rW is the capital cost of the worker-owned asset of the worker's occupied job, as indicated by search theory. w is real wage, and λ is the risk of being unemployed, which equals job description rate.

The discounted present value of the expected profit from a vacant job, V , satisfies the Bellman equation, given as follows:

$$rV = -c + q(\theta)(J - V), \tag{6}$$

where r denotes the interest rate and c is the hiring cost. The left side of the equation denotes the capital cost of the firm-owned asset of the vacant job, which equals the rate of return on the asset, i.e., the right side of the equation. Vacant job cost per unit of time is c, and it changes its state to an occupied job via a Poisson process with rate $q(\theta)$.

Finally, the discounted present value of the expected profit from an occupied job, J, is given by

$$rJ = y - w + \lambda(V - J), \tag{7}$$

where rJ is the capital cost of the job. The job yields a net return of $y - w$ and runs a destruction risk of . λ .

The wage satisfies the Nash bargaining solution, given by

$$w = \arg\max (W - U)^{\beta} (J - V)^{1-\beta}, \tag{8}$$

where β is the bargaining power of employed workers. From the first-order condition, the equilibrium wage is determined by

$$(1-\beta)(W-U) = \beta(J-V). \tag{9}$$

Market equilibrium, defined as (*W*, *U*, *J*, *V*, *w*), is characterized by equations (2) to (9). If either $W - U$ or $J - V$ is negative, job creation never occurs, and market equilibrium is trivial. That is, all workers are unemployed, and all jobs are vacant. To avoid trivial equilibrium, we assume $y - b + c > 0$. As shown later, $W - U > 0$ and $J - V > 0$ in equilibrium under this condition.

From equations (4) and (5), we obtain

$$W - U = \frac{w - z}{r + \lambda + s\theta q(\theta)}. \quad (10)$$

Similarly, combining equations (6) and (7) yields

$$J - V = \frac{y - w + c}{r + \lambda + q(\theta)}. \quad (11)$$

Substituting equations (10) and (11) into (9), we characterize the equilibrium wage as

$$w = \frac{[y + c]\beta(r + \lambda + s\theta q(\theta)) + (1 - \beta)(r + \lambda + q(\theta))z}{r + \lambda + (1 - \beta)q(\theta) + \beta s\theta q(\theta)}. \quad (12)$$

Substituting equation (13) into (10) and (11) yields

$$W - U = \frac{\beta(r + \lambda + s\theta q(\theta))(y + c - z)}{r + \lambda + (1 - \beta)q(\theta) + \beta s\theta q(\theta)} \quad (13)$$

and

$$J - V = \frac{(1-\beta)(r+\lambda+q(\theta))(y+c-z)}{r+\lambda+(1-\beta)q(\theta)+\beta s\theta q(\theta)}. \tag{14}$$

The above equations mean that $W - U > 0$ and $J - V > 0$ under the assumption $y + c - z > 0$

Assume the price index is *P*. We obtain the determination equation for nominal wage, $\overline{w}$, as follows:

$$\overline{w} = \frac{[y+c]\beta(r+\lambda+s\theta q(\theta))+(1-\beta)(r+\lambda+q(\theta))z}{r+\lambda+(1-\beta)q(\theta)+\beta s\theta q(\theta)} P \tag{15}$$

It is indicated that nominal wage is determined not only by traditional factors such as education and tenure but also by labor market tightness, capital per worker, unemployment benefits, and price level.

We calculate total differentiations of labor productivity, y, unemployment benefit, z, and labor market tightness, θ, as follows.

$$\frac{\delta\overline{w}}{\delta y} = \frac{\beta(r+\lambda+s\theta q(\theta))}{r+\lambda+(1-\beta)q(\theta)+\beta s\theta q(\theta)} P > 0, \tag{16}$$

$$\frac{\delta\overline{w}}{\delta z} = \frac{(1-\beta)(r+\lambda+q(\theta))}{r+\lambda+(1-\beta)q(\theta)+\beta s\theta q(\theta)} P > 0 \tag{17}$$

$$\frac{\partial \overline{w}}{\partial s} = \frac{\beta(1-\beta)\theta q(\theta)\big(r+\lambda+q(\theta)\big)\big(\mathrm{y}(A,k)+c-\big)}{[r+\lambda+(1-\beta)q(\theta)+\beta s\theta q(\theta)]^2} P > 0 \tag{18}$$

$$\frac{\partial \overline{w}}{\partial \theta} = \beta(1-\beta)P\frac{\Big[\Big(s(1-\gamma)q(\theta)-q'(\theta)\Big)(r+\lambda)+sq(\theta)^2\Big]\,(y+c-b)}{[r+\lambda+(1-\beta)q(\theta)+\beta s\theta q(\theta)]^2} > 0$$

where $\gamma = -\theta q'(\theta)/q(\theta) \in [0,1]$. (19)

Equation (14) shows that improving labor productivity y increases wage level. This occurs because labor productivity directly increases the total surplus of the job-worker match (Equations. (13) and (14)). Educated workers and long-tenured workers can obtain high wages because labor productivity is an increasing function of education and tenure. Moreover, capital intensity per worker increases wages through improved productivity (Equations.(2) and (3)).

Equation (17) indicates that unemployment benefits z increase the wage level. This occurs because unemployment benefits increase the expected income stream of unemployed workers (Equation. (4)). Hence, the threat point of workers in Nash bargaining is increased, and wages are then increased. For example, an unemployed worker could more patiently await a high-paying job if the benefits received during unemployment are larger. Unemployed Chinese workers usually receive financial support from their families.[4] Workers who are better sustained by familial support are expected to find higher-paying jobs.

The effect of search intensity on wages is examined in Equation (18) and found to increase wage level, too. The reason is that search intensity increases the value of unemployed worker (see Equation (4)); thus, the threat point of workers in the Nash bargaining is increased, and wages are

[4] China's unemployment insurance system had not been completed in many cities during our sample period.

then increased.

Additionally, Equation (19) indicates that if θ is high, the value of an unemployed worker is high whereas the value of a vacant job is low. Thus, the threat point is high for workers and low for firms, leading to a high wage level.

We are interested in the caution of different effects of market tightness on different groups of workers. Because permanent rural migrants and urban-born workers could differ in labor productivity, and their search intensities could also be different due to the gap in access to urban social networks and job information, we calculate whether both factors contribute to market tightness. The results are as follows.

$$\frac{\partial^2 \overline{w}}{\partial \theta \partial y} = \beta(1-\beta)P\frac{\left(s(1-\gamma)q(\theta)-q'(\theta)\right)(r+\lambda)+sq(\theta)^2}{[r+\lambda+(1-\beta)q(\theta)+\beta s\theta q(\theta)]^2} > 0, \tag{20}$$

$$\frac{\partial^2 \overline{w}}{\partial \theta \partial s} = \frac{\beta(1-\beta)(y+c-b)}{(r+\lambda+(1-\beta)q(\theta)+\beta s\theta q(\theta))^3}\Big[\big(r+\lambda+(1-\beta)q-\beta s\theta q(\theta)\big)\big(r+\lambda+q(\theta)\big)\Big(q(\theta)+\theta q'(\theta)\Big)-[(1-2\beta)(r+\lambda)+(1-\beta)q(\theta)-\beta s\theta q(\theta)]\theta q(\theta)q'(\theta)\Big] \tag{21}$$

The above comparative statics show that higher labor productivity amplifies the effect of labor market tightness on wages. Although the interaction effects between search intensity and market tightness are ambiguous, it is indicated that different search intensities indeed affect labor market tightness differently.

Considering firms, labor markets, and workers' human capital, we obtained our theoretical model for wage determination, in which nominal wage is predicted to increase with the price index, unemployment benefits, education, job tenure, capital per worker, and labor market tightness. In addition, the effect of market tightness could differ among the two groups if migrants' labor

productivity or search intensity is different from urban-born residents.

4. Data

Our data mainly come from the Chinese General Social Survey (CGSS), 2008, the fieldwork of which was conducted in September–December 2008, encompassing all Chinese persons aged 18 and older. The sampling design is based on probability proportional to size with four stages (country, town, village, household) using street mapping. The survey was conducted through face-to-face interviews with questionnaires filled in by interviewers and can be considered reliable.

In our study, wage is the average hourly wage, calculated as annual wage and average weekly working hours. It includes all employment income, such as bonus and other income. Education is the individual's years of schooling, and tenure is the amount of work experience. Because we lack information about the capital for each worker's job, we consider average regional capital, using regional industrial electricity use as a proxy. We choose provincial-level labor market tightness for our study, drawing data from the *China Labor Statistical Yearbook* with some simple calculations, because intra-provincial labor flows comparatively freely in China. Moreover, as China's institutional unemployment insurance system was not fully national during our sampled period and unemployed workers usually receive financial support from parents, we choose the father's employment status as a proxy for unemployment benefits z. The variable indicates whether the father is currently employed full-time ($z = 1$) or not ($z = 0$). Finally, we use a city-level consumer price index (CPI), and we choose the housing price index, calculated by the ratio of the lowest price among cities, as a proxy for CPI. We chose this proxy because housing is usually the largest component of the CPI and geographical differences in housing costs potentially affect local CPI significantly (Moretti, 2013). Housing price is the cost of living item that varies most greatly across Chinese cities.

Finally, we introduce variables for controlled and robust checks. They are *rural born* (among workers with urban *hukou*), *firm size*, *full-time employment* (Yes = 1, No = 0), *managerial job* (Yes = 1, No = 0), *labor participation* (Yes = 1, No = 0), *health of the worker*, *years living in cities*, *number of children under age 6*, *married* (Yes = 1, No = 0), and *age*. Among them, *rural born* is "1" if the urban *hukou* worker is a permanent rural migrant and "0" if the worker is an urban-born resident.

Firm size is measured as the number of workers in the firm, and *health condition*, divided into five levels, was obtained by asking respondents to rate their health. *Years living in cities* is equal to the year the respondent obtained urban *hukou* status minus 2008 for those born in rural areas or to age for those born with urban *hukou*. Table 1 shows the descriptive statistics.

Table 1: Descriptive statistics

Variable	Mean	Std. Dev.	Min	Max	Obs
Hourly wage	10.05	20.27	0.09	480.77	2314
Market tightness	1.00	0.23	0.49	1.82	6000
Price level	3.05	2.33	1.00	13.20	6000
Capital per worker	0.0002	0.0001	0.0001	0.0005	6000
Unemployment benefit	0.07	0.26	0	1	6000
Education	9.40	3.68	1	24	5491
Tenure	4.21	7.22	1	52	6000
Male	0.48	0.50	0	1	6000
Years living in cities	38.25	15.85	1	98	6000
Firm size	1272.41	4929.09	2	90000	3678
Full-time Employment	0.83	0.37	0	1	4193
Managerial job	0.26	0.44	0	1	4187
Health	3.68	1.04	1	5	6000
Rural-born (with urban *hukou*)	0.35	0.48	0	1	3414
Labor participation	0.70	0.46	0	1	6000
Children (under age six)	0.14	0.37	0	3	6000
Married	0.84	0.37	0	1	6000
Age	43.21	14.09	18	98	6000

5. Wage determination

5.1 Estimation and the results

This section first examines wage determination in urban China based on the theoretical predication in Section 2. Our reduced-form estimation model is as follows:

$$\ln w_i = \beta_1 \theta_i + \beta_2 \ln P_i + \beta_3 \ln k_i + \beta_4 z_i + \beta_5 edu_i + \beta_6 \text{tenu}_i + \beta_7 tenu_i^2 + \text{a} + \epsilon_i, \quad (22)$$

where w_i is the nominal wage for worker i and β_x is the coefficient. The expected sign of coefficients are $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6 > 0$ and $..\beta_7 < 0$. Further, a is a constant, which involves all constant factors, and ϵ_i is the error term. In our sample, interest rate r, job destruction shock λ, hiring cost c, search intensity s, and bargaining power β share similar values for the same group of workers; therefore, we assume that they are constants for the same groups.

We first examine the wage determination of all workers who have obtained an urban *hukou* (Model 1). Next, we divide that group into two groups of those born in urban areas (Model 2) and those born in rural areas (Model 3), respectively. For comparison, we estimate two models: one using the traditional approach of Mincerian wage determination (Compar.1) and one that disregards the effect of regional price differentials (Compar.2). In those estimations, we control the effects of male, years living in cities, firm size, full-time employment, managerial job, and health.

Table 2 reports the result of ordinary least squares (OLS) estimation. The human capital factors, education, and tenure are significantly positive for the entire sample, permanent migrants group, and original residents group, respectively. This finding is consistent with the prediction of our theoretical model. The positive coefficient of “manager” indicates that holding a managerial position could increase wages for all workers.

Table 2: Estimation result of wage determination of urban *hukou* workers

	Model 1	Model 2	Model 3	Compar.1	Compar.2
Market tightness	0.08	0.21	-0.19		0.67
	[1.04]	[2.19]**	[-1.30]		[9.64]***
ln (Price level)	0.43	0.39	0.53		
	[13.10]***	[10.32]***	[7.94]***		
ln (Capital per worker)	0.002	0.01	-0.03		0.004
	[0.04]	[0.15]	[-0.38]		[0.09]
Unemployment benefit	0.07	0.14	-0.16		0.09
	[1.16]	[2.02]**	[-1.10]		[1.41]
Education	0.09	0.09	0.08	0.10	0.10
	[14.31]***	[11.68]***	[7.81]***	[15.96]***	[16.27]***
Tenure	0.03	0.03	0.02	0.03	0.03
	[4.41]***	[4.46]***	[1.68]*	[4.20]***	[4.77]***
Tenure-squared	-0.0005	-0.0007	-0.0001	-0.0005	-0.0006
	[-2.54]**	[-3.12]***	[-0.41]	[-2.55]**	[-2.92]***
Controlled var.					
Male	0.18	0.11	0.31	0.14	0.16
	[5.12]***	[2.54]**	[4.88]***	[3.67]***	[4.21]***
Years living in cities	-0.00107	0.00133	-0.00270	-0.00026	0.00002
	[-0.67]	[0.59]	[-1.16]	[-0.15]	[0.01]
Firm size	0.00001	0.00001	0.00002	0.00001	0.00001
	[3.67]***	[2.80]***	[2.67]***	[3.60]***	[3.82]***
Full-time employment	-0.02	-0.04	0.01	0.05	0.03
	[-0.31]	[-0.49]	[0.13]	[0.75]	[0.41]
Managerial job	0.36	0.34	0.38	0.37	0.34
	[9.18]***	[7.43]***	[5.25]***	[9.01]***	[8.42]***
Health	0.03	0.03	0.02	0.04	0.04
	[1.29]	[1.18]	[0.45]	[1.96]**	[1.80]*

Rural-born	-0.07			-0.12	-0.13
	[-1.65]*			[-2.77]***	[-2.88]***
Const.	-0.01	-0.12	-0.07	0.23	-0.42
	[-0.03]	[-0.24]	[-0.10]	[1.49]	[-1.01]
Sample	Total	Urban-born	Rural-born	Total	Total
R-squared	0.39	0.38	0.43	0.29	0.33
Adj-R-squared	0.39	0.37	0.41	0.28	0.32
Obs.	1638	1084	554	1638	1638

Note: z-statistics in parentheses, * p<0.1, ** p<0.05, *** p<0.01

Different from previous studies, we examined the effect of labor market tightness in our model. The result shows that labor market tightness significantly and affirmatively affects wages of urban-born workers but has no significant effect on the wages of permanent rural migrant workers. It is indicated that when there are more jobs, urban-born workers are easier to receive higher wages, while permanent rural migrants not. There are several possible explanations for this finding. First, as our theoretical model indicates, greater labor productivity, as determined by education, tenure, and capital intensity per capita, exacerbates the effect of labor market tightness (Equations. (2), (3), and (20)). Although the two labor groups share similar education, the urban tenure of permanent rural migrants is much briefer than that of urban-born residents (Table 4), reducing the effect of market tightness on wages. Second, our theoretical model shows that differences in search intensity could cause differences in the coefficient of market tightness (Eq. (19)). Given their limited urban social networks and information, the search intensity of rural migrant workers—i.e., the number of job search methods in our model—could be below that of urban-born workers. This may also reduce the effect of market tightness on wage growth for permanent rural migrants. Third, although *hukou* discrimination no longer exists toward permanent rural migrants, they could face discrimination in their job search.[5] It may be that urban-born workers speak the local dialect and are more familiar

[5] For instance, a job advertisement for Shanghai Bailian Group Co., Ltd. declared that Shanghai-born people were preferred (http://www.yingjiesheng.com/job/000/464/jobshow_905.html).

with the local culture; furthermore, firms could benefit from the potential social network of urban-born workers.

Moreover, unemployment benefits—familial financial support—have a significantly positive effect on the group of urban-born residents but no significant effect on permanent rural migrant workers. As noted, urban-born workers could more patiently await higher-paying jobs because of familial support during unemployment, an advantage usually less available to rural-born workers.

In addition, the estimation of Comparison 1, which considers only human capital, leads to a lower R-squared, indicating that firm behavior and the labor market are important in wage determination. Moreover, the estimation of Comparison 2, which omitted price differentials across cities, overestimates the effects of market tightness and education.[6]

5.2 Robustness check

Selection problems might arise from possible biases of labor force participation. Although most Chinese women remain employed after marrying or giving birth, we examine selection bias problems for confirmation. We ran two-step Heckman selection models. The first stage was a probit estimation with a dependent variable for labor force participation. Independent variables are the number of children under age six, marital status, age, and age squared. Table 3 reports the results.

[6] The coefficient of price level should be 1, as indicated by our theoretical model. However, the estimated result spans 0.39 to 0.53. This is consistent with the nominal wage growth in China being slower than price growth, especially for rapidly increasing housing prices.

Table 3: Estimation of wage determination using Heckman selection models

	Heckit 1	Heckit 2	Heckit 3	Heckit 4	Heckit 5
ln (Hourly wage)					
Market tightness	0.08	0.02	0.14	0.21	-0.19
	[1.02]	[0.16]	[1.32]	[2.20]**	[-1.33]
ln (Price level)	0.43	0.45	0.40	0.39	0.53
	[13.12]***	[9.57]***	[9.14]***	[10.32]***	[8.05]***
ln (Capital per worker)	0.001	0.04	-0.01	0.01	-0.03
	[0.02]	[0.66]	[-0.24]	[0.14]	[-0.39]
Unemployment benefit	0.07	0.14	0.02	0.13	-0.16
	[1.08]	[1.61]	[0.25]	[1.96]*	[-1.11]
Education	0.09	0.11	0.07	0.09	0.08
	[14.33]***	[12.21]***	[8.67]***	[11.70]***	[7.91]***
Tenure	0.03	0.03	0.03	0.03	0.02
	[4.71]***	[2.74]***	[3.70]***	[4.59]***	[1.70]*
Tenure-squared	-0.0006	-0.0006	-0.0005	-0.0008	-0.0002
	[-2.88]***	[-1.87]*	[-2.14]**	[-3.29]***	[-0.46]
Male	0.18			0.11	0.31
	[5.05]***			[2.52]**	[4.90]***
Years living in cities	-0.0018	-0.0004	-0.0024	0.0007	-0.0029
	[-1.09]	[-0.15]	[-1.10]	[0.29]	[-1.18]
Firm size	0.00001	0.00002	0.00001	0.00001	0.00002
	[3.69]***	[3.27]***	[2.15]**	[2.83]***	[2.69]***
Full-time employment	-0.02	0.05	-0.06	-0.04	0.01
	[-0.34]	[0.55]	[-0.76]	[-0.52]	[0.14]
Managerial job	0.36	0.29	0.40	0.34	0.38
	[9.22]***	[5.01]***	[7.76]***	[7.50]***	[5.31]***
Health	0.03	-0.02	0.06	0.03	0.02
	[1.49]	[-0.56]	[2.03]**	[1.31]	[0.48]
Rural-born (with urban *hukou*)	-0.08	-0.17	0.01		

	[-1.83]*	[-2.85]***	[0.09]		
Const.	-0.07	0.22	0.08	-0.14	-0.08
	[-0.17]	[0.40]	[0.14]	[-0.29]	[-0.12]
Selection: labor force participation					
Children (under age six)	-0.36	-0.43	-0.02	-0.24	-0.12
	[-4.87]***	[-4.57]***	[-0.09]	[-2.24]**	[-0.76]
Married	0.16	-0.18	0.83	0.43	0.08
	[2.06]**	[-1.69]*	[6.03]***	[4.26]***	[0.44]
Age	0.17	0.18	0.17	0.16	0.15
	[13.04]***	[9.56]***	[8.25]***	[9.45]***	[5.11]***
Age squared	-0.003	-0.003	-0.003	-0.002	-0.002
	[-16.66]***	[-11.80]***	[-11.54]***	[-12.48]***	[-7.38]***
const.	-2.47	-2.67	-2.25	-2.14	-1.46
	[-9.94]***	[-7.70]***	[-5.65]***	[-6.80]***	[-2.53]**
Mills ratio					
lambda	0.09	0.08	0.02	0.06	0.02
	[1.62]	[1.07]	[0.30]	[0.97]	[0.22]
Sample	Total	Female	Male	Urban-born	Rural-born
Obs.	3456	1888	1568	1943	1040

Note: *z*-statistics in parentheses, * p<0.1, ** p<0.05, *** p<0.01

We estimate Heckman selection models for the whole sample, females, males, original resident workers, and permanent rural migrant workers. Results obtained are similar to those from OLS estimation. Further, we found that all inverse Mills ratios were not significant. Thus, we adopt the result of OLS for our study.

6. Wage differentials between permanent rural migrants and urban-born residents

6.1 Detailed differences between the two labor groups

Much concern has been expressed about the wage differential between migrants and residents.

Although permanent rural migrants in our study hold an urban *hukou*, the background of migration could lead to heterogeneities between the two labor groups. With the help of a two-sample t-test with unequal variances, we confirm significant wage differences between permanent rural migrants and urban-born residents (Table 4). Furthermore, as shown in Table 4, significant differences appear in factors such as tenure at current job, unemployment benefits, years residing in urban areas, CPI for the resident city, firm size, fulltime employment, and health. However, there are insignificant differences in education, age, sex, labor market tightness, and holding a managerial position. Thus, this section examines human capital endowments, labor markets, and other factors as determinants of the wage differential between urban-born workers and permanent rural migrants.

Table 4: Detailed differentials between urban-born residents and permanent rural migrants

	Urban-born residents		Permanent rural migrants		Ho: diff = 0
	Mean	Std. Dev.	Mean	Std. Dev.	t-value
ln (Hourly wage)	2.04	0.87	1.87	0.95	3.66***
Market tightness	1.01	0.26	1.02	0.27	−0.75
Price level	3.78	2.68	3.25	2.59	4.04***
Capital per worker	0.0002	0.0001	0.0002	0.0001	−3.13***
Education	11.78	3.20	11.62	3.56	0.91
Tenure	10.53	10.14	9.48	9.55	2.17**
Male	0.60	0.49	0.57	0.50	1.32
Years living in cities	37.82	10.54	15.56	10.03	43.83***
Age	37.82	10.54	38.22	10.32	−0.77
Firm size	1378.83	5524.97	995.27	151.72	1.74*
Full-time employment	0.90	0.30	0.84	0.37	3.89***
Managerial job	0.35	0.48	0.32	0.47	1.02
Health	4.09	0.85	3.92	0.90	3.73***

Note: * p<0.1, ** p<0.05, *** p<0.01

6.2 Method

We use a developed version of twofold Blinder–Oaxaca decomposition (Neumark, 1988). First, the difference of log mean wages between urban-born residents and permanent rural migrants can be written as

$$\ln\overline{w}_U - \ln\overline{w}_R = \beta_U\overline{X}_U - \beta_R\overline{X}_R, \tag{23}$$

where $(\beta_U(\beta_R)$ are estimated coefficient factors obtained from the same regression as equation (22) using the subsample of urban-born residents (permanent rural workers). $\overline{X}_U(\overline{X}_R)$ are vectors containing the means of the explaining variables (education, experience, tenure, etc.) for urban-born residents (permanent rural workers).

Following Neumark (1988), we rewrite equation (23) as

$$\begin{aligned}\ln\overline{w}_U - \ln\overline{w}_R &= \beta(\overline{X}_U - \overline{X}_R) + \beta_U\overline{X}_U - \beta_R\overline{X}_R - \beta(\overline{X}_U - \overline{X}_R) \\ &= \beta(\overline{X}_U - \overline{X}_R) + \{\overline{X}_U(\beta_U - \beta) + \overline{X}_R(\beta - \beta_R)\},\end{aligned} \tag{24}$$

where β is a nondiscriminatory coefficient factor obtained from a pooled regression over both groups. Equation (24) means that the difference of mean wages can be decomposed by the following two effects. The first part of equation (24), $\beta(\overline{X}_U - \overline{X}_R)$, is the endowment effect, which can be interpreted as the log-wage difference explained by the group difference in the observable variables. The second part of equation (24), $\overline{X}_U(\beta_U - \beta) + \overline{X}_R(\beta - \beta_R)$, is unexplained but usually attributed to the effects of discrimination by the literature. However, the unexplained part could also arise from difference in coefficients caused by differences in workers' abilities. Our theoretical model has found that different abilities of workers could lead to differences in coefficients. For instance, equation (20)

indicates that higher labor productivity strengthens effects of market tightness. Those differences in coefficients contribute to the unexplained part of the decomposition. Moreover, if there were omitted variables, the unexplained part would further include the potential effects of differences in omitted variables (Jann, 2008). Thus, unlike previous studies of the wage gap in China, ours includes a fuller measure of determinants by including the labor market and price level.

6.3 Result

The results appear in Table 5. First, concerning endowment effects, we found that the wage gap is explained significantly by differences in tenure of the urban job, firm size, and price level of the resident city. Results indicate that longer tenure and larger firm size contribute to the gap in nominal wages. Moreover, the higher price level of the residential city of urban-born workers boosts endowment effects. Because price levels differ greatly among Chinese cities, ignoring price effects could foster underestimation of endowment effects and overestimation of discrimination.

Table 5: Result of Blinder–Oaxaca decomposition

Overall			
Urban-born residents	2.05	explained	0.09
	[78.50]***		[2.63]***
Permanent rural migrants	1.89	unexplained	0.07
	[46.87]***		[1.59]
Difference	0.16		
	[3.39]***		

explained		unexplained	
Market tightness	-0.002	Market tightness	0.41
	[-0.80]		[2.16]**
ln (Price level)	0.06	ln(Price level)	-0.15
	[4.11]***		[-1.90]*
ln (Capital per worker)	-0.0001	ln(Capital per worker)	-0.29
	[-0.04]		[-0.39]
Unemployment benefit	0.01	Unemployment benefit	0.02
	[1.14]		[1.69]*
Education	0.01	Education	0.10
	[0.34]		[0.62]
Tenure	0.03	Tenure	0.15
	[2.19]**		[1.20]
Tenure-squared	-0.02	Tenure-squared	-0.11
	[-1.87]*		[-1.59]
Male	0.01	Male	-0.12
	[1.27]		[-2.74]***
Years living in cities	-0.01	Years living in cities	0.13
	[-0.66]		[1.30]
Firm size	0.01	Firm size	-0.01
	[1.73]*		[-2.18]**
Full-time employment	-0.001	Full-time employment	-0.05
	[-0.24]		[-0.32]

Managerial job	0.01	Managerial job	-0.01
	[0.63]		[-0.41]
Health	0.004	Health	0.06
	[1.16]		[0.30]
		Const.	-0.05
			[-0.06]

Note: Robust standard error in parentheses, * p<0.1, ** p<0.05, *** p<0.01

Second, concerning effects caused by differences in the coefficients, we found that market tightness has a large and significant value of 0.41, indicating that the effect of labor market tightness could be the central explanation for the wage gap. As discussed in Section 3, differences in city tenure, search intensity, and discrimination in job recruitment could be the reasons for the different effects of labor market tightness. The effect of more jobs in the labor market is much larger on wages of urban-born than on permanent rural workers, which enlarges the wage gap between urban-born workers and permanent rural workers. That is a most important finding in our study.

Moreover, results indicate that the coefficient effect of price level reduces the nominal wage gap. Because China's CPI, especially for housing prices, has greatly risen, real wages adjusted for the level of prices have concerned workers. Urban-born workers perhaps may live with their parents or receive parental rent support, whereas parents of rural-born workers likely remain distant, engaged in low-income agricultural work. Rural-born workers' could be more concerned about a real wage increase than urban-born workers, amplifying price-level effects for rural-born workers.

The coefficient effect of unemployment benefits enlarges the wage gap between rural-born and urban-born workers. As discussed, urban-born workers can obtain much more financial support from their parents, which contributes to their benefit returns from unemployment status and thus increases their wages, as indicated by our theoretical model. For instance, urban-born workers could be more patient in waiting for a higher-paying job because they are less worried about being unemployed when they are receiving adequate financial support from their city-dwelling parents. Finally, the coefficient for the effect of maleness decreases the wage gap between urban-born and rural-born, indicating that perhaps male rural migrants face less discrimination than female workers.

Although education and managerial employment are important in wage determination (Section 3),

the decomposition result indicates they have neither endowment nor coefficient effects and do not contribute to the wage gap. The group of permanent rural–urban migrants are as well educated as urban-born workers and have opportunity for managerial employment.

7. Conclusion

This study has examined wage determination in urban China in a model capturing human capital, firms, and labor markets. It concentrated on the wage gap between urban-born workers and permanent rural migrants in China. Empirical results indicate that human capital and labor market factors are important in wage determination. However, the determinants of the wage gap are not education but labor market factors and unemployment benefits. Permanent rural migrants are as well educated as urban natives, and their returns on education do not differ. Even so, in our model and estimation they derive little benefit from increased market tightness because of their shorter tenure at urban jobs, reduced social networks, and discrimination.

Moreover, we found that differences in price level are important and ignoring its effects could lead to misunderstanding the real wage differential and discrimination. On the one hand, more urban-born workers live in cities where the price levels are high, comparing to rural-born migrant workers. On the other hands, an increasing price level could have larger effect on nominal wages of rural-born migrant workers than urban-born resident workers. Thus separating those price effects from the major effects is important to understand real wage gaps between the two groups of workers.

As education improves in rural areas, increasing numbers of rural Chinese residents could be able to migrate permanently instead of accepting temporary, low-skilled jobs in cities. Moreover, by July 2014, 13 provinces had abolished the division between urban and rural *hukou*.[7] As numbers of permanent rural migrants grow, their segmentation from urban-born workers will receive greater scholarly attention.

Overall, we found that the wage gap could arise from differences not only in human capital factors but also in labor market-related factors. As a policy implication, our results indicate that supporting the workers' ability to adapt to urban labor markets could reduce wage inequality.

[7] http://ah.sina.com.cn/news/m/2014-08-04/1031111398.html

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