Assimilation and the Wage Growth of Rural-to-Urban Migrants in China[†]

(Preliminary and Incomplete)

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Abstract

This paper analyzes the assimilation process and the wage growth of rural-to-urban migrants in China. Although migrants initially earn significantly less than urban workers, their wages rise more rapidly with city experience in the first 10 to 15 years. However, migrants' wages cannot catch up with those of urban workers in the long run. We then consider four sources of migrants' wage growth: (1) the rising return to imported human capital, (2) the accumulation of urban work experience, (3) the mobility up the occupational ladder, (4) the sectoral transition in cities. We find that rising prices of skills, accumulated urban experience, and occupational transitions account for the observed wage growth of migrant workers in China.

Keywords: rural-to-urban migrant, earnings growth, assimilation, China

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1 Introduction

The rapid growth in rural-to-urban migration is one of the most important labor market changes over the past three decades in China. While labor mobility was restricted by the household registration (*Hukou*) system during the centrally planned regime, regulations governing internal migration were gradually relaxed and excess labor force was released from farm work with the progression of the economic reform. Since the 1980s, China witnessed the largest movement of labor force within a country in history. According to the National Bureau of Statistics (NBS) of China, more than 260 million Chinese people lived in cities and towns other than where they registered their *Hukou* for over half a year in 2012, including more than 160 million rural-to-urban migrant workers. The labor mobility from the low-productivity rural sector to the high-productivity urban sector is one of the driving forces of China's economic growth (Bosworth and Collins 2008). In spite of the public concerns with discrimination against migrant workers, and the increased interest in the impact of rural-to-urban migration and hence in migration and *Hukou* policy, the earnings and labor market behavior of migrant workers have not been the subject of much systematic research. This paper is intended to fill this void in the literature by examining the wage assimilation and wage growth of rural-to-urban migrants in urban China.

Most of the recent rural migrant workers have less of the characteristics associated with higher earnings than the urban workers. Migrant workers have a lower level of schooling, a mean of 9.3 years compared to a mean of 12.2 years for the urban workers (see Table 1). They are nearly 8 years younger than are the urban workers (32 years compared with 40 years) and are less likely to be married. Their monthly earnings (1733 yuan) was approximately 70% of urban workers' earnings (2458 yuan) even though they work much longer hours.

Migrant workers start at a low wage because they typically have less knowledge of the customs and local dialects relevant to city jobs, have less firm-specific training, and have less information about city job opportunities. They are also likely to be treated with prejudice and to sort themselves into low-paying occupations and sectors. As they accumulate more

urban work experience, however, migrant workers gain knowledge of the local labor market, acquire job-specific training, search for better matches with urban employers, and move up the occupation ladder. As migrant workers spend more time in the urban labor market, urban employers also become less uncertain of their potential and true productivity, and as a result migrant workers may be treated more like urban workers. These factors provide migrant workers with growing wages as they spend more time in cities.[1]

The focus of this paper is on the dynamics of the wages of rural migrant workers following their entry to cities. Upon arrival in urban areas, migrants start at low-skill occupations receiving low wages that do not differ by initial schooling. As they spend more time in cities they move into occupations requiring more skills with a corresponding rise in wages, generating wage differentials by initial schooling (see Tables 3 and 4). Migrants' wage growth is thus closely linked to job and occupation mobility. One important goal of this paper is to assess the importance of wage growth within and across occupations among rural migrants in China.

We specify and estimate a simple human capital earning equation to describe the dynamics of the wages of migrant workers vis-a-vis urban workers by using the 2008 and 2009 waves of the Longitudinal Survey on Rural Urban Migration in China (RUMiC).[2] Using the estimated wage function, we first analyze the assimilation process for rural migrants in China. The estimated wage functions show that migrant workers earn 46 percent lower than comparable urban workers upon arrival in cities. Their wages rise more rapidly than the wages of urban workers during the first 14 years of their city experience. However, migrants' wages cannot catch up with those of urban workers in the long run.

[1] There exist a large number of empirical studies on international migration and the earnings growth of immigrants in the host country (see Baker and Benjamin, 1994; Borjas, 1985, 1994, and 1999; Chiswick, 1978; LaLonde and Topel, 1997).

[2] The Longitudinal Survey on Rural Urban Migration in China (RUMiC) consists of three parts: the Urban Household Survey, the Rural Household Survey and the Migrant Household Survey. It was initiated by a group of researchers at the Australian National University, the University of Queensland and the Beijing Normal University and was supported by the Institute for the Study of Labor (IZA), which provides the Scientific Use Files. The financial support for RUMiC was obtained from the Australian Research Council, the Australian Agency for International Development (AusAID), the Ford Foundation, IZA and the Chinese Foundation of Social Sciences.

Then we use retrospective information on migrant workers' first jobs, combined with information on their current jobs reported in 2008 or 2009, to assess the contributions of four factors to migrant workers' wage growth over time: (1) the rising return to imported human capital, (2) the accumulation of urban work experience, (3) the mobility up the occupational ladder, (4) the sectoral transition in cities. We find that rising prices of skills, accumulated urban experience, and occupational transitions account for the observed wage growth of migrant workers in China.

Given the size of the Chinese economy and its massive rural-to-urban migration, it is not surprising that considerable research effort has been devoted to understanding this migration behavior. The existing literature on China's internal migration by and large focuses on several standard topics of migration, including the study of return migration (e.g., Hare 1999; Zhao 2002), the interaction between education and migration (e.g., Zhao 1999; De Brauw and Giles 2008; De Brauw et al. 2002), the association between family characteristics and income gap with migration (e.g., Taylor, Rozelle and de Brauw 2003; Zhu 2002; Zhang and Song 2003), the effects of migration on agricultural productivity and rural poverty (e.g., Rozelle et al. 1999; Du et al. 2005), and the earnings difference between rural migrants and urban residents at a given point of time (e.g., Meng and Zhang 2001; Lu and Song 2006; Démurger et al. 2009). In this study we attempt to understand the wage assimilation of rural-to-urban migrants and the sources of migrants' wage growth over time, which have received insufficient attention in a China context.[3]

This paper also contributes to the economic literature on economic assimilation, labor mobility and the impact of migration on structural transformation and wage distribution. Most existing studies find rather speedy assimilation rate of migrants' wage to the wage of comparable native workers in the context of international immigration. For instance, LaLonde and Topel (1997) report rates of assimilation measured by changes in wage difference between immigrants and natives in the range from 8% among Europeans to 24% among

[3]The closest paper related to our study is Zhang and Meng (2007), which uses two repeated cross-sectional data from China Income Distribution Survey 1999 and 2002.

Asians during the 1970s in the U.S. Eckstein and Weiss (2004) find that immigrants from the USSR to Israel assimilate at a rate of about 20% during the first 10 years during the 1990s. In the context of internal migration, Borjas, Bronars and Trejo (1992) study interstate movements in the United States and show that internal migrants initially earn less than natives but experience a higher growth rate so that the wage differential disappears after a few years. Yamauchi (2004) finds that labor-market assimilation rate is faster for educated migrants than non-educated internal migrants to Bangkok. Existing literature also emphasizes individual migration behavior in the context of spatial equilibrium (Todaro 1969; Topel 1986; Kennan and Walker 2011). However, all these studies lie within the context of a competitive and well-functioning labor market. The growth in the size of rural-to-urban migration in China has been unprecedented amid rapid economic growth and profound institutional transformations, including the loosening of the household registration system, the integration of previously segmented regional labor markets, and rapid urbanization. These drastic changes offer researchers a unique opportunity to study both conventional and new determinants of internal migration. This paper offers new insights into the effects of migration have had on the Chinese labor market.

The rest of the paper is organized as follows. In Section 2, we present a brief descriptive history of rural-urban migration in China. In Section 3 we describe the data, and in Section 4 we present the empirical wage function and analyze migrants' wage assimilation. Section 5 presents various robustness checks. Section 6 describes the decomposition of the wage growth of migrants, and Section 7 concludes.

2 Rural-Urban Migration in China: A Brief Descriptive History

During the centrally planned regime in China, virtually no labor mobility was allowed between the rural and urban sectors. Rural-urban divide was enforced by the household reg-

istration (*hukou*) system and a food rationing system. Individuals born in rural villages are assigned with "agriculture *hukou*" whereas those born in cities receive "nonagriculture *hukou*." The rationale for the household registration system is to keep most of the population in the countryside and to ensure food provision and industrialization in cities.

Beginning in the late 1970s, China's economic reform started and regulations governing internal migration were gradually relaxed. In the countryside, the rural reforms of the late 1970s and early 1980s increased agricultural productivity substantially and generated significant number of rural surplus labor (Lin 1992; Zhao 2004). The government began to encourage farmers to leave agricultural production and to set up and work in local township and village enterprises (TVEs) in the 1980s. The rural industry in the form of TVEs generated employment and promoted growth but its capacity to absorb rural labor soon reached its peak.

A major policy reform took place in 1988, when the control over labor flows was officially relaxed. Farmers were allowed to move to cities if they could provide their own staples and were financially capable of running a business. This policy was initially a response to the demand for unskilled labor in the limited Special Economic Zones, but rural-to-urban migration remained extremely restrictive at the time. Since the 1990s and especially after China's accession to the World Trade Organization (WTO) in 2001, urban economic growth accelerated and the demand for unskilled labor in China's export-oriented manufacturing sector and urban informal sector increased explosively.

Farm households reacted to these policy changes and market developments in a responsive manner. In the late 1970s, more than 90% of rural employment was still engaged in agricultural work. Starting in the mid-1980s, a large number of rural workers began to seek employment in rural off-farm work. After the deregulation on rural-urban migration in the late 1980s, the size of rural migrants in cities increased rapidly. Rural-urban migration has become the most prevalent form of labor supply to off-farm activities since the late 1990s. Rural-to-urban migrant workers increased from 25 million to 37 million between 1990 and

1997, and by 2009 the size of migrant worker almost quadrupled to 145 million and the percentage of rural employment in agriculture dropped below 60% (Meng, 2012; Ge and Yang, 2011).

Although having a agriculture *hukou* no longer directly restricts a rural resident to move to cities, rural migrants still tend to be treated differently because of their *hukou* status. An urban *hukou* is associated with local health insurance, retirement pensions, unemployment benefit and other social welfare and social services, which rural migrant workers without local *hukou* have little access to. China also follows a "guest worker" system with controls over the type of jobs rural migrants can have, and hence rural migrants often take jobs which urban workers are unwilling to take (Zhao 1999; Meng 2012). Therefore the *hukou* system continues to generate institutionalized discrimination against rural migrants in Chinese cities.

3 Data and Summary Statistics

The main source of data for this paper comes from the Rural Urban Migration in China (RUMiC) dataset. Each RUMiC survey consists of three components: the Urban Household Survey (UHS), the Rural Household Survey (RHS) and the Migrant Household Survey (MHS). The project is designed to track households as long as they remain in the surveyed cities and villages. The UHS and RHS were conducted using random samples from the annual urban and rural household income and expenditure surveys conducted by the National Bureau of Statistics (NBS). A migrant is defined as a person who lives in an urban area but has rural household registration (*hukou*). Due to the mobile nature of migrants in China, an innovative sampling frame based on workplaces (rather than residences) was created for the MHS. A systematic tracking strategy is adopted to follow individuals over time. In this paper we primarily use data from the 2008 and 2009 waves of the MHS and the UHS.[4]

The original 2008 MHS sample covers approximately 5,000 migrant households from fif-

[4]See Kong (2010) and Akgüç, Giulietti and Zimmermann (2013) for details on the structure, sampling frame and tracking method of the RUMiC surveys. We access the 2008 and 2009 waves of RUMiC from International Data Service Center (IDSC) of IZA at http://idsc.iza.org/?page=27&id=58.

teen cities, and the 2008 UHS sample covers approximately 5,000 urban households from nineteen cities in nine provinces.[5] The panel attrition was rather low at 5.8% for individuals in the UHS between 2008 and 2009. In contrast, the attrition rate was as high as 58.4% for the MHS despite substantial efforts to track individuals over time. The significant attrition is due to the mobile nature of migrant workers and the large return migration as the consequences of the global financial crisis that hit China's economy in 2009 (Akgüç, Giulietti and Zimmermann 2013). To maintain the original sample size, a resampling based on the pre-survey census was conducted (see Meng 2013, for details). The 2009 MHS thus consists of an "old sample," which tracks household members originally surveyed in 2008 and members newly added to the migrant families through marriage or kinship, and a "new sample," which is a fresh randomly drawn sample followed in subsequent waves.

The RUMiC survey questionnaires record demographic and socioeconomic characteristics of household heads and members, including detailed information on employment, earnings as well as the personal characteristics of each household member. The MHS also include questions on migration history. We pool the two waves of the UHS to construct an urban sample and combine the two waves of the MHS to construct a migrant sample. To facilitate the comparison of labor market outcomes between urban and migrant workers, we first drop the individuals in the urban sample from the four cities (Anyang, Jiande, Leshan and Mianyang) not covered by the MHS. Our sample for analysis includes all females aged 16 to 55 and males aged 16 to 60 as 55 and 60 are the official retirement ages in China for women and men, respectively. Moreover, we exclude from our sample family business helper without pay, farmers, and soldiers. For the analysis of wage assimilation, we further restrict the migrant sample to those who were older than 16 when they first migrated out for work.

[5] The MHS was conducted in fifteen cities that are the top rural-urban migration destinations in China. Eight of these cities are in coastal regions (Dongguan, Guangzhou, Hangzhou, Nanjing, Ningbo, Shanghai, Shenzen, Wuxi), five are in central inland regions (Bengbu, Hefei, Luoyang, Wuhan, Zhengzhou) and two are in the west (Chengdu and Chongqing). All the cities are selected from the nine largest provinces sending and receiving migrants including Shanghai, Jiangsu, Zhejiang, Hubei, Sichuan, Guangdong, Henan, Anhui and Chongqing. The UHS was conducted in nineteen cities and includes the following additional cities to the MHS: Anyang, Jiande, Leshan and Mianyang.

The wage measure used in this paper is the hourly wage rate in 2008 yuan. RUMiC collect information on respondents' average total monthly income from all jobs with pay, which includes wages, bonus, allowance and commutation in kind for wage earners, net income for the self-employed. We compute hourly wage rate by dividing average monthly labor income by average monthly hours worked. Real wages in 2008 prices were calculated using consumer price index, and respondents whose wages were below 1 yuan or above 100 yuan were dropped. Moreover, the sample is restricted to full-time workers that work for 35 hours per week or more. This yields a migrant sample of 9,239 observations and an urban sample of 10,930 observations.

To analyze sectoral transitions, we define four broad occupational categories: white-collar occupations (WC), which include professionals, managers, and principals in state agencies, party organizations and enterprises; pink-collar occupations (PC), which include clerks and sales workers; blue-collar occupations (BC), which include manufacturing, construction and low-skilled service workers; and self-employment. Workers in the sample report various ownership categories for their employers. We combine government and party agencies, state and collective public service units, solely state-owned or state holding enterprises, solely collective-owned or collective holding enterprises into the category of "state sector," and combine individually owned, private owned or private holding enterprises, and self-employed individuals into the category of domestic "private sector." All other ownership types including joint-venture companies, stock-holding firms, and solely foreign-owned enterprises are grouped into a separate category of "other sector." Finally, based on the contract type of their jobs, workers in the sample are also classified into a category with permanent or long term contract and a category with short term or no contract, which includes self-employment.

The descriptive statistics of rural migrants and urban workers are shown in Table 1. Rural migrants earned significantly less and worked significantly longer hours than their urban counterparts in the sample. The monthly labor income for urban residents was 2458 yuan, whereas the amount for migrant workers was 1733 yuan, which accounts for 70% of

urban residents' wage. Migrants worked 254 hours a month on average, which is 40% more than the monthly 181 hours urban residents worked. When the difference in hours worked is taken into account, the hourly wage gap is further enlarged. Migrant workers were paid 7.2 yuan per hour on average, which is approximately half of the average hourly wage of urban residents. Rural migrants were much younger, less educated and less experienced than their urban counterparts. The migrant workers in the sample were on average 8 years younger and almost 3 years less educated than urban workers, and they were less likely to be married.

From Table 1, we also observe significant segregation between migrant and urban workers in the urban labor market. For example, urban workers were mainly employed in the state sector (54.1%), whereas most rural migrants worked in urban private and individual sector (80.2%). In terms of occupation distribution, most migrants were either employed in unskilled blue-collar occupations (56.0%), or self-employed (26.5%). On the other hand, urban workers were more likely to be employed in white-collar occupations (27.5% versus 3.0%). In addition, urban workers were much more likely to have permanent or long-term contract (76.5%) than rural migrants (40.8%).

Information on migrant workers' age at first migration and city experience is presented in Figure 1. As the top panel of Figure 1 shows, migrant workers typically move to cities at young age. Almost half of the migrants (47.7%) in our sample migrated to cities for the first time by age 20, and an additional 33.6% of them migrated by age 30. The average age at first migration for the sample is 23.8. The bottom panel of Figure 1 presents the distribution of migrants' city experience, as measured by years since first migration. On average, the migrant workers in the sample had resided in cities for 8 years. More than 40% of them had spent less than or equal to 5 years in cities by 2008 or 2009, indicating that many of the migrant workers in the sample migrated to cities after the year of 2000. Although rural-to-urban migration is often considered temporary as acquiring urban *Hukou* is difficult, we still observe that 29% of the migrant workers had spent more than 10 years in cities.

The focus of this paper is to study the dynamics of the wages of migrant workers, which requires longitudinal data following migrant workers since they enter the urban labor market. Although the RUMiC survey makes great effort to track individual migrants over time, the sample attrition rate was very high for the MHS between 2008 and 2009. In addition, we are not able to observe much variation in wages or occupation transition within two years.

Fortunately, the MHS include retrospective questions to migrant workers on their first jobs after migration. Information was collected on the occupation of the first job, ownership type, industry of the firm, tenure, hours worked and wages on the job for all migrants in the 2008 MHS. In the 2009 MHS, the same questions were asked to the new members of the 2008 households and those individuals in the 2009 newly-added sample. Similar information is available for each worker's current job in both years. We construct a sample of migrant movers, for whom we can track wage growth and job turnover between their first jobs after migration and current jobs in 2008 or 2009. After applying the same sample restrictions as for the cross-sectional sample, we generate a migrant mover sample of 4,122 individuals.

Table 2 compares the job characteristics between the first job and the current job among the migrant movers. On arrival to cities, migrant workers start at low-skill occupations receiving low wages. Approximately 81 percent of migrant workers' first jobs were in blue-collar occupations, such as manufacturing workers, construction laborers, or restaurant and hotel staffs. The majority of them worked in private and individual firms (81.5%) and had no contract or short-term contract (70.3%). The average monthly wage at the first job was 957 yuan, which translates to an hourly wage slightly above 4 yuan. As time passes migrant workers move into higher-skill occupations and jobs with longer contract with a corresponding rise in wages. In particular, on their current jobs in 2008 or 2009, migrant workers in blue-collar occupations reduced by 21 percentage points, from 80.8 percent to 59.8 percent, as they moved into self-employment and pink-collar occupations. Despite the observed occupational transition over time, the number of migrants working in white-collar occupations remained very low at 3 percent in 2008/2009. As the migrants accumulate more

city experience, their employment shares across firms of different ownership types stay more or less constant. The majority of migrants work in non-state sectors, even after spending years in the urban labor market. On the other hand, migrants were able to move to more stable jobs over time, and 44.1 percent of the jobs held in 2008/2009 had permanent or long-term contract, 14.4 percentage points higher than the number of first jobs with permanent or long-term contract. The average monthly wage at the current job was 1715.7 yuan, 79 percent higher than the average month wage at the first job. As monthly hours worked was largely unchanged over time, hourly wage rate increased by similar magnitude from 4.1 yuan to 7.2 yuan per hour.

When migrant workers took their first jobs after migration, their wages did not differ much by imported schooling (see Table 3). Workers with college education earned 9 percent more than those with primary school education. Experience in the urban labor market created disparity by imported schooling over time. Although more educated workers had spent less time in cities on average, their wage grew faster. Therefore the wage gap widened with time spent in the cities. At their current jobs in 2008/2009, college workers earned 2013 yuan, 28.4 percent higher than the monthly wage of workers with primary school education.

Migrants' wage growth is also closely linked to changes in occupation. As shown in Table 4, there existed some initial differences in the occupational distribution of first jobs among migrants. Over time, the more educated migrant workers climb up the occupational scale faster, obtaining better jobs and higher wages in each job. Among all migrant workers, only 3 percent of them worked in white-collar occupations in 2008/2009, whereas among migrant workers with college education, more than 12 percent had white-collar jobs. Thus, there is substantial wage growth both within and across occupations in the raw data. An important goal of this paper is to access how much these two channels contribute to migrant workers' wage growth in China.

4 Analysis of Wage Assimilation

4.1 Basic Empirical Framework

The empirical analysis of the wage assimilation of rural-to-urban migrants is based on the standard human capital earning function (Mincer 1974). Suppose that we pool all the data in the 2008 and 2009 waves of the MHS and UHS in RUMiC. The baseline wage function can written as

$$\ln w_i = \beta^1 EDU_i + \beta^2 EXP_i + \beta^3 EXP_i^2 + \mathbf{Z}_i\boldsymbol{\phi} + \gamma y_i + \alpha^0 M_i + \varepsilon_i, \tag{1}$$

where w_i gives the hourly wage of worker i, EDU_i gives the worker's years of schooling, EXP_i and EXP_i^2 are potential experience, computed as $\min[(age - EDU - 6), (age - 16)]$, and experience squared, respectively, $\mathbf{Z}_i$ gives a vector of socioeconomic characteristics including dummy variables for gender, marital status and regions, a constant, and the worker's sector affiliation in some specifications, y_i is a dummy variable indicating if the observation was drawn from the 2009 wave of the surveys, M_i is equal to 1 if the observation is of a migrant worker and is equal to 0 otherwise, and ε_i is a residual. The coefficient β^1 captures the rate of return to each additional year of schooling. The coefficients β^2 and β^3 determine the rate at which urban workers' wage increases over the life cycle. The coefficient γ gives the time effect. The coefficient α^0 captures the average wage difference between migrant and urban workers conditional on observed worker characteristics.

In order to assess the effects of occupational transition and discrimination on the wage of migrant workers, we include occupations, ownership and contract types in some specifications of the wage equation in (1). We generate dummy variables for white-collar occupation, pink-collar occupations and self–employment and leave blue-collar occupations as the reference group. Dummy variables for ownership are defined for the state sector and other sector, leaving domestic private sector as the reference group. We also include a dummy variable

indicating if the tenure of the contract is permanent or long-term. The inclusion of sectoral dummies in the wage equation is somewhat nonstandard. We allow occupation to have a separate effect (conditional on schooling) on wages because occupational transitions may play an important role in wage determination, especially for migrants. In China, because of the institutional setting and economic transition, there are also large variations in wages by ownership type and contract type. In addition, as argued by Meng and Zhang (2001), rural migrants and urban workers work in a two-tier market in China, where rural migrants are less likely to obtain jobs in high-paying occupations, jobs from the state sector or jobs with job security. These variations are essential to understanding the wage difference between rural migrants and urban workers and the wage growth of migrants, and we therefore include them as additional explanatory variables in the wage equations.[6] When sector affiliations are included as additional covariates, the coefficient on migrant dummy measures the within-sector wage difference between migrant and urban workers.

Among migrant workers, it is important to decompose years of labor market experience into experience before and after migration, as the experience acquired prior to migration in villages may have a weaker effect on earnings than years of training in cities (Chiswick 1978). Therefore a separate variable on the number of years since migration, YSM, is included in the wage function for migrant workers. As a result, we also estimate the following wage function

$$\ln w_i = \beta^1 EDU_i + \beta^2 EXP_i + \beta^3 EXP_i^2 + \mathbf{Z}_i\boldsymbol{\phi} + \gamma y_i + M_i(\alpha^0 + \alpha^1 YSM_i + \alpha^2 YSM_i^2) + \varepsilon_i, \quad (2)$$

where all the variables have the same definitions as the corresponding variables in equation (1), and YSM_i measures the number of years since the migrant worker arrived in a city for the first time. In this specification, the life-cycle earning profile of migrant workers is

[6] We could potentially introduce industry affiliation as additional controls in the wage equation (1), but there is a large overlap between industry classification and occupation classification. For example, high-skilled service sector overlaps with white-collar occupations significantly, and manufacturing sector largely overlaps with blue-collar occupations.

determined by the combination of coefficients β^2 and α^1, and β^3 and α^2. The coefficients α^0, α^1 and α^2 determine how the average migrant and urban wage difference (conditional on worker characteristics) changes as migrant workers spend more time in cities. For example, the wage profiles of migrants and urban workers converge if $\alpha^0 < 0$, $\alpha^1 > 0$ and $\alpha^2 = 0$.

4.2 Regression Results

Table 5 presents the basic set of regressions results for the pooled sample of urban and migrant workers. Two specifications of (1) and (2) with (col. 2 and 4) and without (col. 1 and 3) controlling for employment sectors are estimated. We cluster the standard errors to account for multiple observations over time. The coefficient of the migrant dummy variable in col. 1 implies that, ceteris paribus, migrant workers have hourly wage 36.8 percent lower than comparable urban workers on average, in contrast to the simple difference of 49 percent lower wage. Not surprisingly, migrant workers' lower level of schooling and work experience partially account for their inferior wages compared to urban workers.

When the variable years since migration (YSM) is included in the pooled log wage equation in col. 3, a more complete picture emerges. Holding constant schooling, experience and other socioeconomic characteristics, migrants earn 46 percent lower than urban workers upon arrival in cities. Their wage rises with time spent in cities at a decreasing rate. Other things held constant, the hourly wage of migrant workers is 38 percent lower than urban workers 5 years after migration, 33.5 percent lower after 10 years, but migrants wage will never catch up with that of urban workers according to the estimates.[7] For the wage of migrant workers to never exceed urban workers' wage suggests that the greater work motivation, or investments in training in cities of migrant workers cannot offset wage disadvantages persist from discrimination against them or from their initially having less knowledge and skill relevant

[7] From col. 3 of Table 5, $\partial \ln w / \partial (Migrant) = -0.4598 + 0.0195 \times YSM - 0.0007 \times YSM^2$, and the effect of YSM on wage is at maximum when YSM is equal to 14 years. The predicted percent difference in wage between the urban and migrant workers for different duration since migration are: 1 year, -44.1; 5 years, -38.0; 10 years, -33.5; 14 years, -32.4. Based on these estimates, the wages of urban and migrant workers will never crossover.

in the urban labor market.

Col. 2 and 4 in Table 5 report the specifications that allow occupation, ownership type and contract type to have separate effects (beyond schooling) on wages. Col. 2 shows that the wages in white-collar occupations, pink-collar occupations and self-employment are on average (respectively) 35.1%, 15.6%, and 22.8% higher than in blue-collar occupations. Working for the state sector and other (joint venture and foreign) sector generates (respectively) 13.5 and 10 percent wage premiums compared to working for the domestic private sector, whereas those having a long-term or permanent contract earn 20.6 percent more than those with short-term or no labor contract. The introduction of sector dummies has significant impact on the estimated coefficients on other variables. For the schooling coefficient, it drops from 0.0720 to 0.0495 when occupation and other sector dummies are included. Similarly, the experience coefficient drops from 0.0198 to 0.0174 after including sector dummies. Highly educated and more experienced workers tend to sort themselves into better-paying sectors, and thus accounting for a significant portion of the returns to education and experience. More importantly for our analysis, the coefficient on the migrant dummy changes from -0.3680 to -0.2543 after including sector dummies. Migrant workers are much more likely to work in low-paying sectors, and thus within-sector wage differentials between migrant and urban workers (25.4%) are much smaller than the overall wage differentials (36.8%). When the variable YSM is included in the log wage equation in col. 4, migrants are found to earn 32.7% lower than comparable urban workers in the same sector when they first arrive in cities. According to our estimates, the within-sector wage gap between migrant and urban workers exhibits similar pattern as the overall wage differential. The within sector gap shrinks in the first 15 years, but the difference persists in the long run.

4.3 Pervasiveness of the Wage (Non)convergence

Table 5 presents evidence that migrants' wages fall short of the wages of comparable urban workers. While these results may accurately reflect the average wage differentials between

migrant and urban workers, it is interesting to know how far-reaching these differences are. In this subsection we consider separate analyses of wage assimilation by subgroup. We find that the non-convergence of migrant and urban workers' wages is pervasive and robust across a variety of dimensions, including gender, marital status, education, and region.

We estimate the earnings functions specified in (1) and (2) separately by gender (male and female), marital status (married and single), education level (high school and above, and middle school and below), and by region (East, Central, and West). Table 6 summarizes the regression results without (panel A) and with (panel B) controlling for employment sector for each subgroup. The first column presents the coefficient estimates on migrant dummy when YSM is included in the wage equation, and they are interpreted as the wage differentials between comparable migrant and urban workers at the time when migrants first arrive in cities. The second column presents the coefficient estimates on migrant dummy without controlling YSM, and they capture the average migrant and urban wage differentials in the sample conditional on socioeconomic characteristics. The third column is the average YSM for migrants in each group. In order to compare how fast migrants' wages converge to the wages of comparable urban workers between subgroups, in the last column of Table 6 we take the differences between the wage differentials at time of arrival and the average wage differentials and divide them by the average YSM and use the results as linear approximations of the annual wage convergence rates between migrant and urban workers.

We first present the results for all workers by taking the estimates from Table 5. Migrants on average earn 46% lower than urban workers at time of arrival. After approximately 8 years in the city, comparable migrant and urban workers' average wage gap shrinks to 36.8%. Migrant and urban wage gap reduces by 1.15 percentage points per year in the first 8 years after migrants move to cities. When we estimate our basic wage equations disaggregated by gender, we find that female migrant workers' wage was 41.2% below female urban workers' wage, as compared to 50% wage gap between male migrant and urban workers. Within 6.9 years, female migrant workers close their wage gap with female urban workers by 9.7

percentage points, whereas it takes male migrant workers 8.8 years to close their wage gap with male urban workers by 8.8 percentage points. Our results indicate that female migrant workers fare better in the urban labor market at the time of arrival, and they also seem to experience faster wage assimilation relative to their male counterpart.

Migrant workers arrive in cities as single or married. Family structure is found to have a significant effect on the labor market integration and wage of migrants (Baker and Benjamin, 1997). Thus we conduct separate analysis for single and married migrant workers. The wage gap between single migrant and urban workers is much lower than the gap between married migrant and urban workers (28.7% versus 53.3% at time of arrival and 21.0% versus 40.9% on average). Single migrant workers seem to be able to catch up with urban single workers' wage at a much fast rate (2.10 percentage points per year), although the actual difference may be smaller as single migrant workers in the sample have on average been in cities for 3.7 years whereas married workers' average cities experience is 10.3 years. These patterns reflect that the coordination with family and children may exert a negative effect on migrants' labor market outcome.

The bottom potions of panel A in Table 6 present the wage differentials by education and region. Given the small number of college workers among migrants, we group individuals with high school and above education together and compare them with those without high school education. The more-educated migrant workers experience less disadvantage with respect to urban workers at time of arrival. Their average wages were 38.7% below urban workers with the same education, whereas the less-educated migrant workers earn 50.3% below urban low-skilled workers. The wage gap between migrant and urban workers with at least high school education barely changes over the next 6 years, but the less-educated migrant workers' wage increases significantly relative to their urban counterpart. As shown in Table 3, more-educated migrant workers experience faster wage growth than less-educated migrants. It appears that the wage growth rates of the more-educated migrant and urban workers are similar but the wage growth rate of the less-educated urban workers is the most

sluggish. With regard to location, the eastern region experiences the largest migrant wage disadvantage despite having a slightly higher wage convergence rate.

Panel B of Table 6 presents the migrant and urban wage differentials by worker characteristics within employment sector. The wage differentials at time of arrival in Col. 1 and the average wage differences in Col. 2 in Panel B are much smaller for all subgroups than those in Panel A without controlling for employment sector. Therefore, sorting into different employment sectors in terms of occupation, ownership and contract types account for a significant portion of the wage differentials between migrant and urban workers. Within each employment sector, male, married, less-educated migrant worker and those work in the eastern region still experience more inferior wage relative to their comparable urban workers. The wage convergence rates in Panel B are also much lower than the convergence rates in Panel A, indicating that job mobility across sectors is an important channel for migrants' wage assimilation.

As noted already, migrant and urban workers' wage gap becomes smaller as migrants spend more time in cities, but the wage of migrant workers cannot exceed urban workers' wage. Figure 2A and 2B present the predicted log wage differences between migrant and urban workers for different durations since migration. Figure 2A looks at the convergence of migrant and urban wages averaged across sectors. For all workers and each subgroup separated by gender, marital status, education and region, migrant workers' wages tend to converge to urban wages during the first 10 to 15 years after first migration, but their wages remain inferior to urban wages in the long run. Consistent with the results in Table 6, female, single, less-educated migrant workers and those work in the central and western regions experience more wage assimilation and lower wage gaps relative to equivalent urban workers than male, married, more-educated migrants and those located in the eastern region. Figure 2B presents the predicted migrant and urban wage gaps over time within employment sector. Similar to Table 6, migrant and urban wage gaps are much smaller and wage convergence rates are lower within sector. There is also no long-run wage convergence within sector even

though the difference in wage between migrant and urban workers shrink in the first few years after migration.[8]

5 Robustness Checks

5.1 More Flexible Effects of YSM

The estimated coefficients on YSM and YSM squared in Table 5 and the predicted migrant and urban wage differentials illustrated in Figure 2 based on these estimates indicate that migrant and urban wage gaps are hump-shaped over the duration of migration, that is, the wage gaps initially decline but rise after some time. One concern is that the curvature in the predicted wage gaps may be driven by the quadratic form of YSM in the wage equation (2). We address this concern by estimating a more flexible specification of the wage equation as follows:

$$\ln w_i = \beta^1 EDU_i + \beta^2 EXP_i + \beta^3 EXP_i^2 + \mathbf{Z}_i\boldsymbol{\phi} + \gamma y_i + M_i[\rho^0 + \sum_{t=1}^{T} \rho^t I(YSM_i = t)] + \varepsilon_i, \quad (3)$$

where all the variables have the same definitions as the corresponding variables in equation (2), and $I(\cdot)$ is an indicator function that is equal to one if migrant worker i has spent t years in the urban labor market and zero otherwise. In this specification, each additional year of migrants' city experience is allowed to have separate effect on their wage. When migrant workers first arrive in cities (i.e., $YSM_i = 0$), the average migrant and urban wage difference conditional on worker characteristics is captured by ρ^0. After spending t years in cities (i.e., $YSM_i = t$), the average wage difference is determined by $\rho^0 + \rho^t$.

Figure 3 presents the predicted average migrant and urban wage differentials by the duration since first migration based on estimates of specifications (2) and (3). The top

[8] In Figure 2, single migrants' wage tends to converge to comparable urban workers' wage. However, the average YSM for single migrants in the sample is 3.7 years, thus we may overestimate their wage convergence rate.

panel presents results from specifications without controlling employment sector, and the bottom panel presents within-sector wage differentials. The solid lines with diamonds are the estimated log wage differentials based on the quadratic YSM specification in equation (2). They are hump-shaped as the estimated $\alpha^1 > 0$ and $\alpha^2 < 0$. The solid lines with squares are the estimated log wage differentials based on the more flexible YSM specification in equation (3), with their 95% confidence interval presented by the dashed lines.[9] The estimated migrant and urban wage differentials remain hump-shaped and trace very closely their quadratic approximations. These results confirm our conclusion that migrants' wages rise more rapidly than comparable urban workers when they first arrive in cities, but they cannot catch up with urban wages in the long run.

5.2 Differential Returns to Characteristics and Sector Affiliations

In the pooled wage functions specified in (1) and (2), we assume that urban and migrant workers have the same coefficients on characteristics and sector affiliations. However urban and migrant workers may work in segregate labor markets in urban China because of their different *hukou* status. Therefore, we estimate a pooled wage function that allows urban and migrant workers to have different coefficients on characteristics:

$$\begin{aligned} \ln w_i &= \beta_u^1 EDU_i + \beta_u^2 EXP_i + \beta_u^3 EXP_i^2 + \mathbf{Z}_i\boldsymbol{\phi}_u + \gamma_u y_i + M_i\{ \\ &\quad \left(\beta_m^1 - \beta_u^1\right) EDU_i + \left(\beta_m^2 - \beta_u^2\right) EXP_i + \left(\beta_m^3 - \beta_u^3\right) EXP_i^2 + \\ &\quad \mathbf{Z}_i(\boldsymbol{\phi}_m - \boldsymbol{\phi}_u) + (\gamma_m - \gamma_u)y_i + \alpha^0 + \alpha^1 YSM_i + \alpha^2 YSM_i^2\} + \varepsilon_i, \end{aligned} \tag{4}$$

[9] We estimate equation (3) with $T = 40$, as YSM varies from 0 to 40 with a mean value of 8 in our sample. In Figure 3, we present the estimates for $YSM \leq 25$ because the coefficient estimates when $YSM > 25$ are mostly statistically insignificant due to the small sample size. All coefficient estimates when $YSM \leq 23$ are statistically significant.

where M_i is the migrant dummy. The coefficients with a u subscript are the returns to characteristics and sector wage premiums for urban workers, and the coefficients $\left(\beta_m^1 - \beta_u^1\right)$, $\left(\beta_m^2 - \beta_u^2\right)$, $\left(\beta_m^3 - \beta_u^3\right)$, and $(\boldsymbol{\phi}_m - \boldsymbol{\phi}_u)$ measure the deviations of migrants' returns to characteristics or sector wage premiums from those of urban workers, and $(\gamma_m - \gamma_u)$ captures the different time effects for migrant and urban workers.

Col. 1 in Table 7 reports the estimation result of wage equation (4) without controls for occupation, ownership and contract types. The interactions of the migrant dummy with both years of education and years of potential experience are negative and highly significant. For the urban workers, the rate of return to an extra year of schooling is 8.8 percent, whereas for migrant workers it is only 5.2 percent. Similarly, the rate of return to potential experience is 2.2 percent for urban workers and 1.2 percent for migrant workers. In addition, male wage premium, marriage wage premium and the wage premium for working in the east region are all significant lower for migrant workers. The lower returns to characteristics for migrant workers may be the results of persistent discrimination against migrants or because migrants' education and skills are considered less relevant or they are less valued in the urban labor market. The aggregate time effects are not statistically different for urban and migrant workers. The estimated year 2009 dummy shows that, despite the massive rural-urban migration, the hourly wage of all workers increased by over 11 percent between 2008 and 2009.

The age-earning profiles of migrants are governed by the coefficients on experience and years since migration. Holding constant schooling and other socioeconomic characteristics, an additional year of city experience generates 0.0176 $(= 0.0267 - 0.0091)$ wage premium for migrant workers relative to comparable urban workers, and this effect decreases over time. According to the estimates in col. 1 of Table 7, the effect of YSM on wage is at maximum when YSM is equal to 11 years. Figure 4 presents the predicted migrant and urban log wage differentials for migrant workers in the eastern region in 2008, who first migrate to cities at the age of 24. Log wage differentials are plotted by years since migration

for migrants of different education, gender and marital status. All wage differential profiles are hump-shaped, thus they confirm our previous finding that migrant workers are able to close their wage gaps relative to comparable urban workers, but the wage gaps would persist in the long run. As shown in Figure 4, the differences in returns to characteristics are crucial in explaining the wage difference between urban and migrant workers. For single young women with little education, there exists little wage disadvantage for migrant workers.[10] But the wage gap enlarges for more educted migrants because migrant workers have lower returns to education. In the mean time, as urban workers have a significantly larger marriage premium and male wage premium than migrant workers, married and male migrants earn more inferior wages than urban workers with the same characteritics.

Col. 2 in Table 7 reports the specification that controls for occupation, ownership, and contract types. The wages in white-collar occupations, pink-collar occupations and self-employment are (respectively) 34.3%, 19.0%, and 47.9% higher than in blue-collar occupations for urban workers. Working for the state sector and other (joint venture and foreign) sector generates more than 10 percent wage premium compared to working for the domestic private sector for urban workers, whereas those having a long-term or permanent contract earn 36.1 percent more than those with short-term or no labor contract. The coefficients on the sector dummies for migrants show that in general sector wage premiums are much lower for migrant workers. For example, migrant workers who work in pink-collar occupations earn a 5.3 percent wage premium relative to those in blue-collar occupations, whereas urban workers in pink-collar occupations earn a 19 percent wage premium. Similarly, migrant workers in the state sector earn a 8.8 percent wage premium relative to those in the private sector, but urban state workers earn a 14.6 percent wage premium compared to urban

[10] In fact, once we allow for the differences in wage coefficients in education, experience and other characteristics, those migrants in the reference group (single female in the west region with no education and experience) in our regression earn 25.8 percent more than urban workers with equivalent skill levels upon arrival in cities, according to the estimated coefficient on the migrant dummy. In our data, however, this hypothetical reference group does not exist as all migrant workers have at least one year of formal schooling. This result illustrates that those single, female, and less-skilled migrant workers have the least disadvantage relative to comparable urban workers. Recent work by Kuhn and Shen (2015) finds that employers may prefer migrant workers to locals, especially in jobs requiring lower levels of education and offering low wage.

private workers. After we control for sector affiliations, the differences in returns to characteristics between migrant and urban workers become much smaller. For example, without controling for occupation, ownership and contract types (col. 1 of Table 7), migrants' return to education is 3.6% lower than that of urban workers; whereas after sector controls (col. 2 of Table 7), migrants' return to education is 1.0% lower. Therefore the ability to enter the high-paying occupations and sectors accounts for a significant portion of urban workers' wage premiums. Within employment sector, an additional year of city experience generates 0.0184 $(= 0.0240 - 0.0056)$ wage premium for migrant workers relative to comparable urban workers, and this effect decreases significantly over time. Therefore, the within-sector migrant and urban log wage differentials remain hump-shaped.

5.3 Cohort Effects and Age at Migration

Borjas (1985) and Borjas (1995) show that accounting for immigrant cohort effects are important to understanding convergence between the earnings of immigrants and natives in the U.S. In the context of China's rural-urban migration, the skills of successive migrant cohorts may also change over time as the entire labor force becomes more educated, and thus in Col. 3 of Table 7 we control for cohort effects for migrants. We include in equation (4) dummy variables for migrant workers first arriving at a city in the 1990s and in the 2000s, and leave those migrated before 1990 as the reference group. The coefficients on the cohort dummies capture the differences in entry wages across successive migrant cohorts. It is well known that the parameters of the regression model in equation (4) with cohort dummies are not identified (Borjas 1995). In order to separately identify the time effect, the cohort effect, and the years since migration effect, a restriction must be imposed on the model. Following the literature, we impose the restriction that the time effects are the same for migrant and urban workers. In particular, $\gamma_u = \gamma_m$, so that migrant and urban workers are subject to the same secular changes in the wage level between 2008 and 2009 due to common aggre-

gate shocks.[11] Col. 3 and 4 in Table 7 report the specifications of the pooled regression model while including dummies for migrants' cohort of arrival and imposing the restriction of common time effects, with and without controls for occupation, ownership and contract types. The estimates indicate that there do not exist sizable cohort effects among Chinese migrant workers, conditional on observed productive characteristics such as education and experience. The estimates on returns to worker characteristics and sector premiums or the coefficients on YSM and YSM^2 are not significantly affected by the inclusion of cohort effects.

An individual's age at migration can influence his/her adaptation process in host region (Friedberg 1992). The wage determination process experienced by young migrants is more likely to resemble that faced by urban workers. Therefore it is important to control for age at first migration to better specify the wage growth of rural migrants. In Col. 5 and 6 of Table 7, we expand the model by including the migrant's age at first migration in the regression. To identify this model, we still need to impose the time effects to be the same for rural migrants and urban workers. But the introduction of age at migration as an additional control variable implies that independent variables are still perfectly collinear. In particular, age at first migration is equal to the difference between the migrant's age and years since migration, where age is perfectly collinear with potential experience EXP_i. Therefore the model is not identified unless we impose an additional restriction on the data. Following the literature (Friedberg 1992; Borjas 1995), we assume that the coefficients of the potential experience variables are the same for rural migrants and urban workers, that is, $\beta_m^2 - \beta_u^2 = \beta_m^3 - \beta_u^3 = 0$. Although this additional assumption is obviously very restrictive, it is clear that some restriction must be imposed if age at migration has an independent effect on wage. Col. 5 and 6 of Table 7 report the estimates of the expanded model. Age at first migration has an important negative effect on migrant wage: a worker who migrates

[11] Based on the estimates in col. 1 and 2 in Table 7, the aggregate time effects are not statistically different for urban and migrant workers.

at age 30 has 5.7 to 8.0 percent lower wage than one who migrates at age 20.[12] But the wage assimilation processes are similar for individuals who migrate at various ages as the coefficients on YSM and YSM^2 are not significantly affected by the inclusion of age at first migration.

5.4 Return Migration and *Hukou* Conversion

Another concern is that a lack of success in cities may be associated with shorter urban work experience. If less successful migrants are more likely to return to their home villages, our estimates may overstate wage assimilation. According to data on return migrants from the RHS in RUMiC, return migrants are slightly less educated (8.4 versus 9.3 years of schooling) compared to migrant workers in cities. If the selection of return migrants is primarily on the observed characteristics, our subgroup analyses in Table 6 and Figure 2 show that our main results on wage assimilation are robust conditional on observed characteristics. In addition, the return migrants in the sample report to look after a home business or agriculture and to look after a household member as the main reasons to return home villages, consistent with findings in Zhao (2002). There is no strong evidence that quicker returns are associated with a lack of success in the urban labor market.

On the other hand, if the most successful migrants obtain urban *hukou* thus are classified as urban workers in our sample, we may underestimate the true migrant assimilation. In Table 8, we compare urban workers who converted their *hukou* status from agriculture to non-agriculture with those who had non-agricultural *hukou* at birth. These two groups of urban workers have virtually the same characteristics and earnings. The primary ways to get urban *hukou* are through education, military service, land expropriation, or purchasing urban housing. Obviously the group of migrants who become *hukou* converters are a very

[12] Typically, migrants start at a low wage and then they invest in local human capital and search for better matches with local employers as they spend more time in the city. These processes combine to provide migrant workers with increasing returns to their imported skills. To capture such a trend for the investment behavior of migrants, we have also considered specifications that allow for an additional interaction between schooling and years since migration in the wage equation for migrants but we do not find evidence of increasing returns to migrants' imported skills. These results are available upon request.

selected few. The focus of the study is to analyze the wage assimilation and growth of the migrants who are not able to get urban *hukou,* as urban *hukou* remain inaccessible to most of rural migrant workers. The fact that *hukou* converters are able to do as well as other urban workers indicate that the institutional barrier imposed by the *hukou* system may be the main obstacle for economic assimilation of migrant workers in urban China.

6 A Decomposition of Migrant Wage Growth

The purpose of this section is to decompose the migrants' wage growth into various sources. The wage function posits that the average wage reflects workers' characteristics and the labor market prices of individual characteristics. Consequently, changes in the wage level over time result from two components: changes in the distribution of individual characteristics and changes in the wage premiums for different worker characteristics. Consider the following wage function for migrant workers that have moved jobs:

$$\ln w_i^\tau = \sum_j \beta_j^\tau X_{ij}^\tau + \varepsilon_i^\tau, \tag{5}$$

where w_i^τ gives the hourly wage of migrant worker i at job $\tau \in \{F, C\}$, representing the first job after migration and the current job, respectively; X_{ij}^τ is the migrant's jth characteristic on job τ; β_j^τ is the market price for the jth characteristic; and ε_i^τ represents a random error.

For wage growth from the first job after migration ($\tau = F$) to the current job ($\tau = C$), the difference in the log wage over the two periods can be written as

$$\overline{\ln w_i^C} - \overline{\ln w_i^F} = \sum_j \widehat{\beta}_j^C \overline{X}_j^C - \sum_j \widehat{\beta}_j^F \overline{X}_j^F, \tag{6}$$

where $\overline{\ln w_i^F}$ and $\overline{\ln w_i^C}$ are the average log wage on the first job and on the current job, respectively. $\overline{X}_j^F$ and $\overline{X}_j^C$ are the mean values of the jth characteristic, and $\widehat{\beta}_j^F$ and $\widehat{\beta}_j^C$ are the estimated wage premiums for the corresponding worker characteristics. Rearranging

equation (7) gives us

$$\overline{\ln w_i^C} - \overline{\ln w_i^F} = \sum_j \beta_j^*(\overline{X}_j^C - \overline{X}_j^F) + \{\sum_j (\widehat{\beta}_j^C - \beta_j^*)\overline{X}_j^C + \sum_j (\beta_j^* - \widehat{\beta}_j^F)\overline{X}_j^F\}, \qquad (7)$$

where $\beta_j^* s$ are the estimated coefficients from a pooled regression over the observations on both the first jobs and the current jobs (Neumark 1988). This equation decomposes the wage growth of migrant workers between their first jobs after migration and their current jobs into two components. The first term on the right-hand side of equation (8) represents the portion of the log wage change that is due to changes in worker characteristics $\left(\overline{X}\right)$, and the second is that due to changes in returns to characteristics (β).

We estimate equation (6) using the observations on the first jobs, the current jobs, and the pooled sample. Migrant workers' years of education, years of potential experience and its square term, years since migration and its square term, gender, marital status, regional dummies, the jobs' occupation, ownership and contract types, and a constant are included in the vector of individual characteristics. By combining the sample values of mean characteristics and the estimated coefficients, we can decompose the growth in the log wage into the various components of wage change. In particular, we assess the relative importance of the price change of individual characteristics, urban work experience, and occupational and sectoral transition on the wage growth of rural-to-urban migrants.

Table 9 presents the decomposition results of migrant wage growth from the first job after migration and the year of 2008 or 2009. During this period, the average wage increased by 0.5866 log points for all migrants. The changes in factor returns and sector premiums account for 65.1 percent of total wage growth. In particular, the rise in the base wage for migrant workers (27.58 percent), the increasing return to schooling (20.54 percent) and the rise in regional wage premiums (15.34 percent) are the three major components. The remaining 34.9 percent of the migrants' wage growth is attributable to improvements in worker characteristics and reallocations to highly paid sectors. The accumulation of city experience

can account for 25.21 percent of the wage growth. Occupational transition attributes to another 6.48 percent of the wage growth, and ownership and contract type make relatively minor contributions to the documented migrants' wage growth.

In the last two columns of Table 9, we present the same decomposition results for migrant workers with at least high school education. The base wage of the more educated migrants accounts for a much large portion of the overall wage growth (57.32 percent versus 27.58 percent). In addition, the accumulation of city experience and occupation transition also make more significant contributions to wage growth for those migrant workers with at least high school education.

7 Conclusion

This paper analyzes the economic progress, as measured by hourly wage, of rural-urban migrant workers in the city. The study involves comparisons between migrant and urban workers, and between when migrants first arrived in the city and after they spent a few years in the city.

Upon arrival, migrants earn on the average substantially less than the urban workers with similar characteristics. As earning rise more sharply for migrants in the first few years after migration, the wage gap narrows. However, over time wage gap between migrant and urban workers persist.

We then consider four sources of migrants' wage growth using a panel of migrants: (1) the rising return to imported human capital, (2) the accumulation of urban work experience, (3) the mobility up the occupational ladder in cities, (4) sectoral transition in cities. We find that rising prices of skills, accumulated urban experience, and occupational transitions account for the observed wage growth of migrant workers in China.

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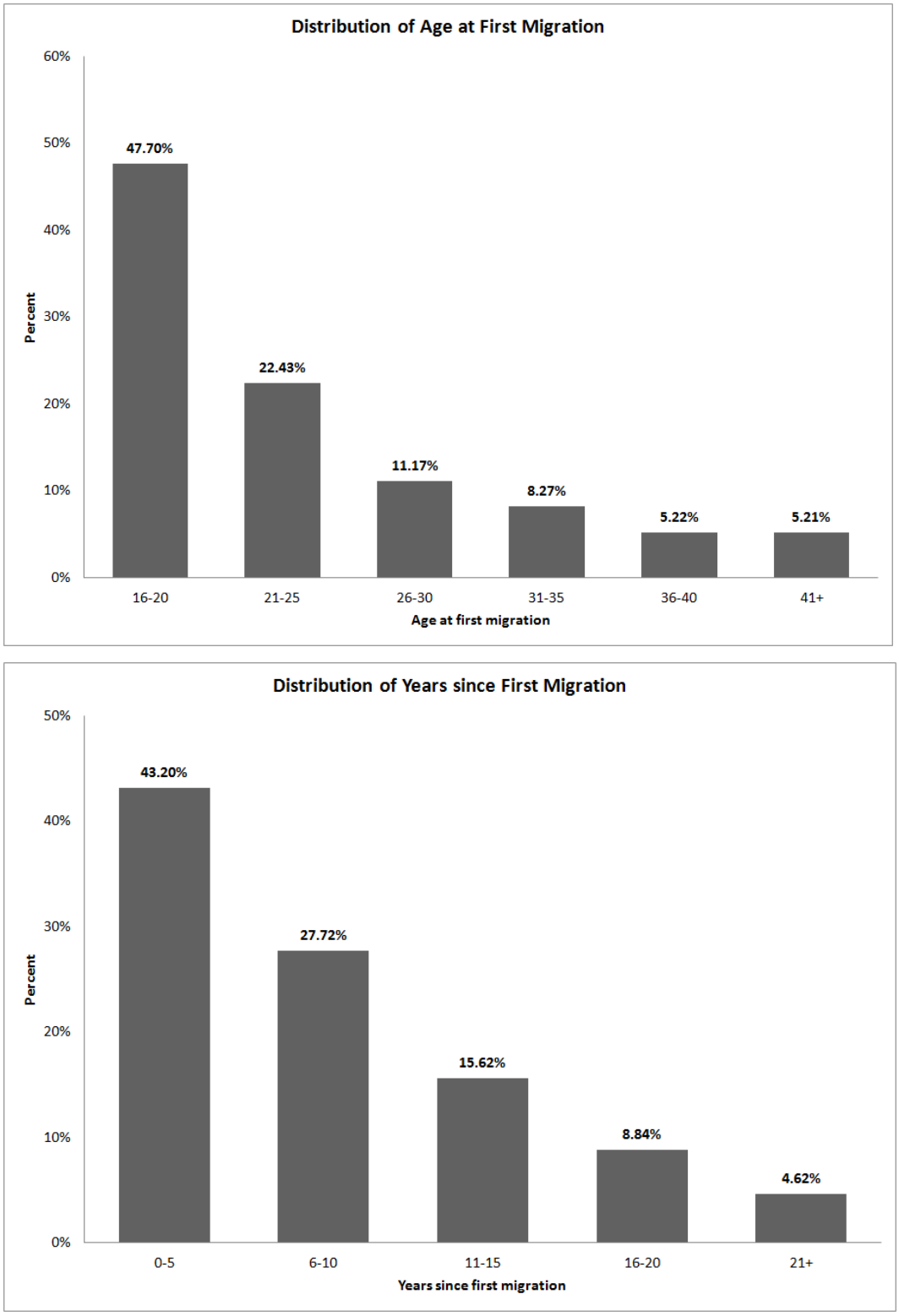


Figure 1: Migrants Distribution, by Migration Age and City Experience

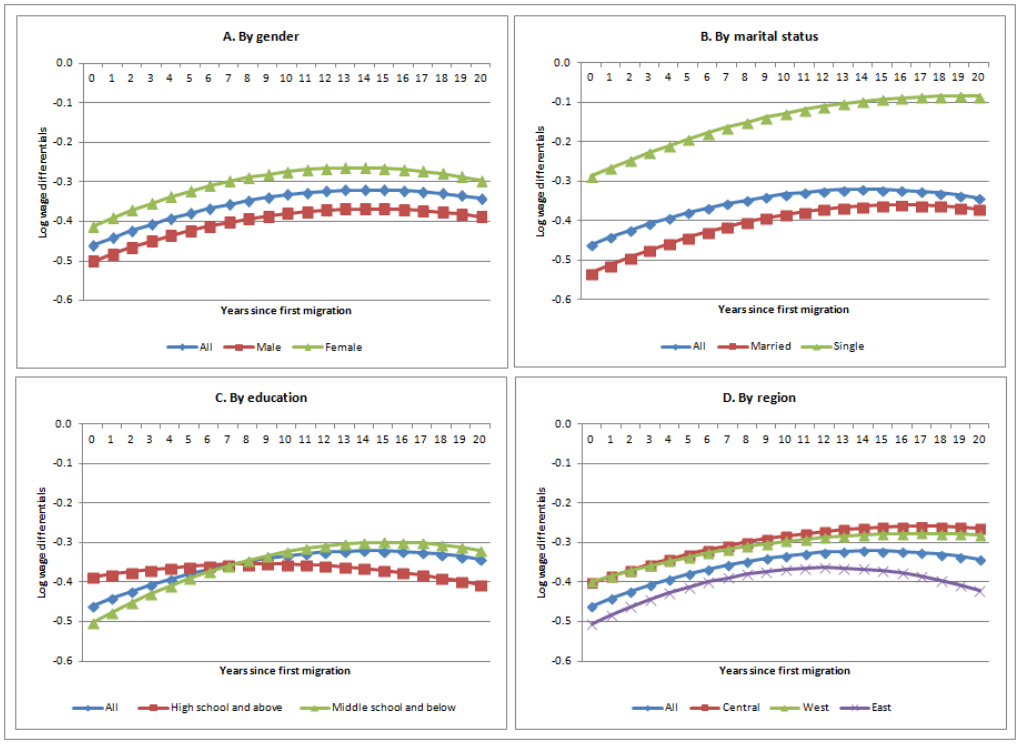


Figure 2A: Predicted Migrant and Urban Wage Differentials by Years since Migration

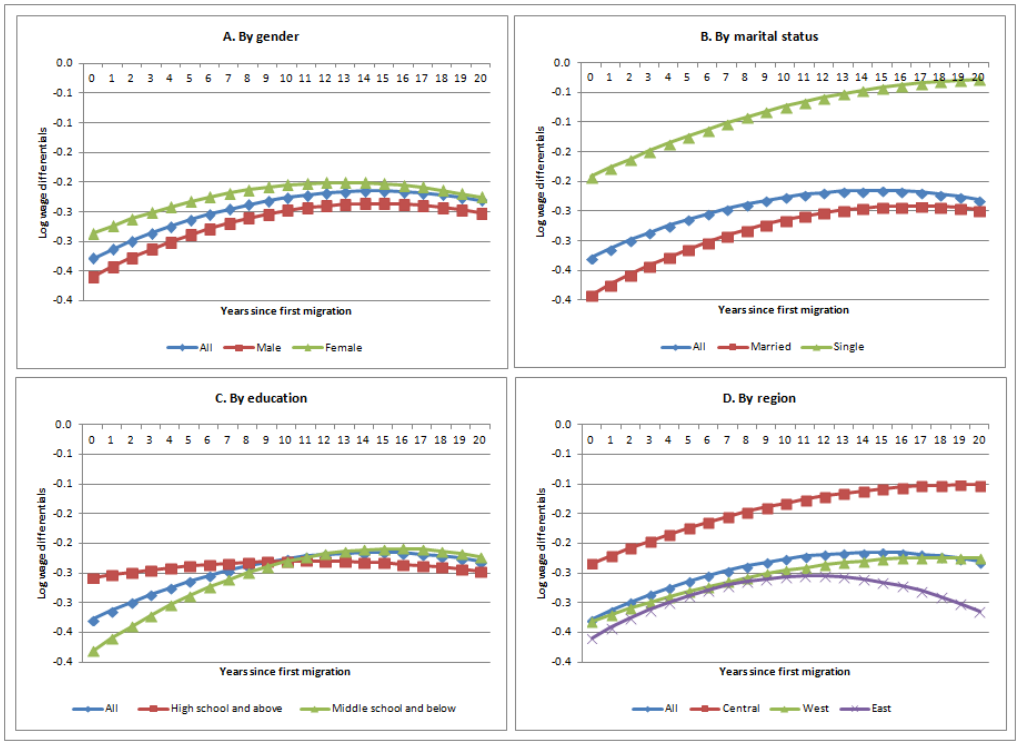
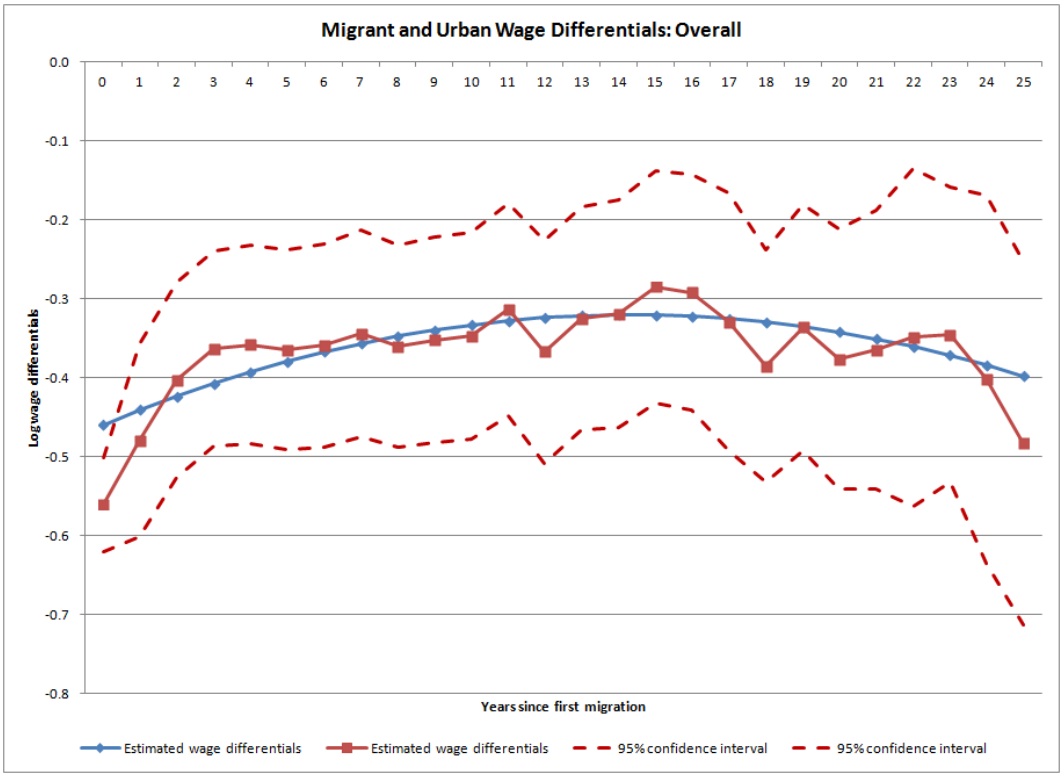


Figure 2B: Predicted Migrant and Urban Wage Differentials

within Sector by Years since Migration



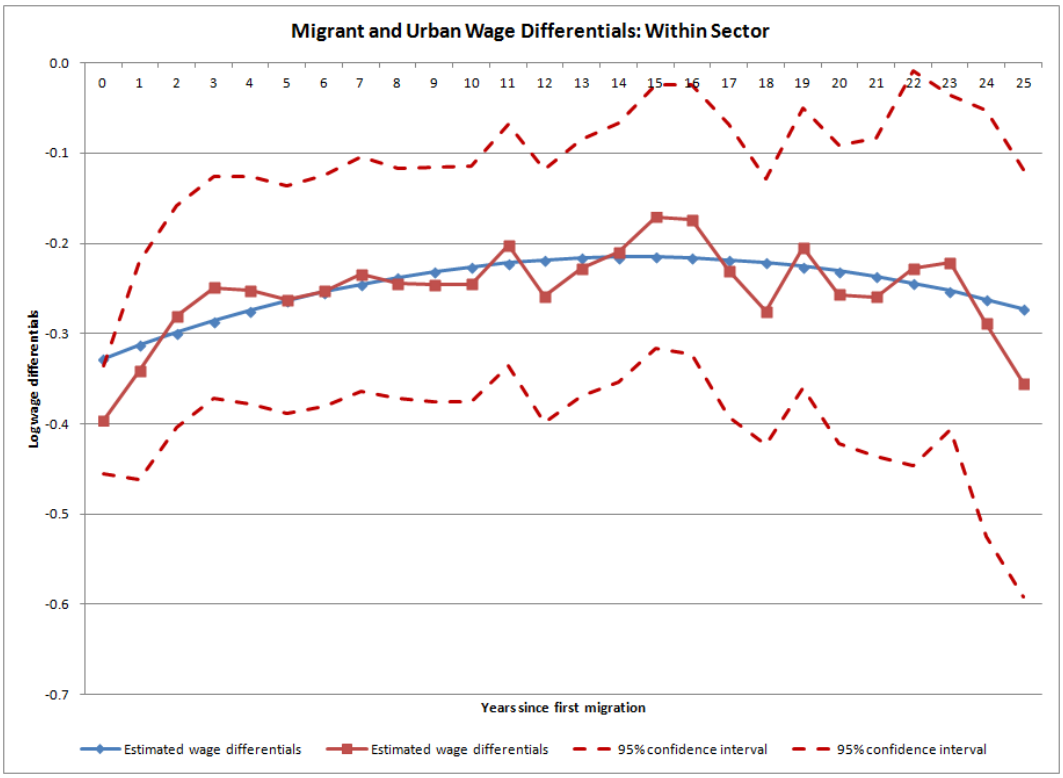


Figure 3: Robustness Check on Predicted Migrant and Urban Wage Differentials

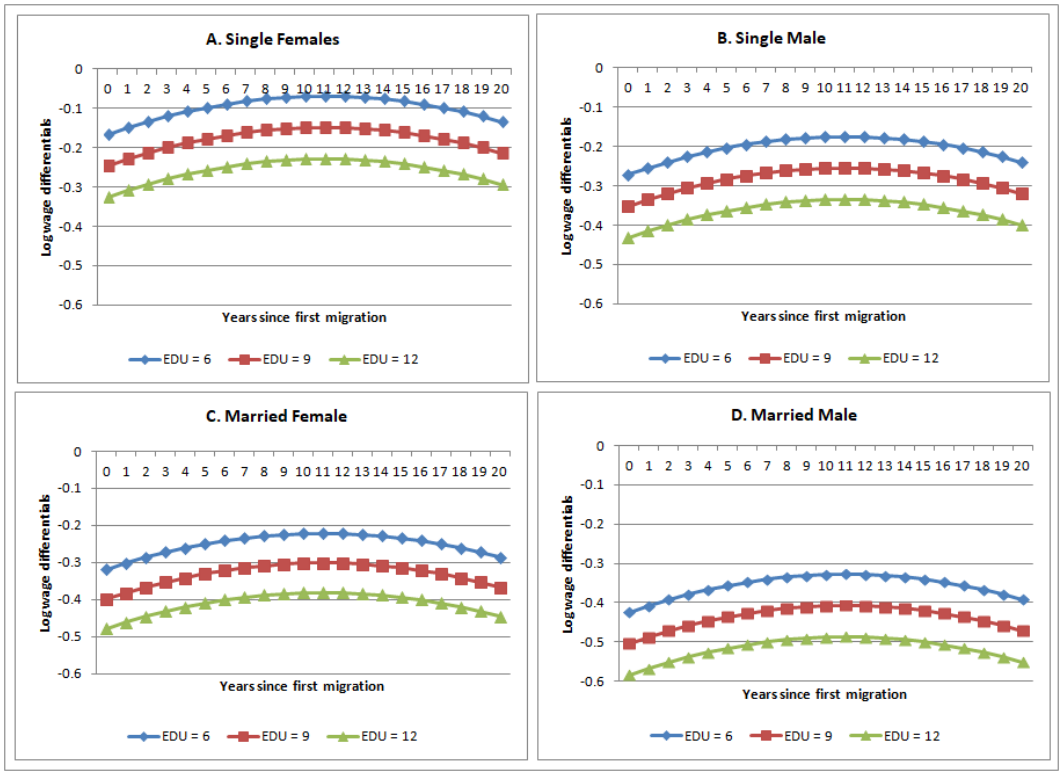


Figure 4: Predicted Migrant and Urban Wage Differentials for Migrant Workers in the Eastern Region in 2008 (Age at Migration = 24)

Table 1: Summary Statistics from the Pooled 2008 and 2009 MHS and UHS Samples

	Migrant Workers	Urban Workers	Difference in Mean
	(1)	(2)	(3) = (2) - (1)
Monthly wage (yuan)	1733.3	2457.7	724.4
	(1249.1)	(1856.0)	
Monthly hours worked	254.4	181.0	-73.4
	(69.8)	(39.3)	
Hourly wage (yuan)	7.2	14.2	7.0
	(5.1)	(10.9)	
Age	31.9	39.9	8.0
	(9.6)	(9.6)	
Years of schooling	9.3	12.2	2.9
	(2.5)	(3.2)	
Years of potential experience	15.2	21.2	6.0
	(10.0)	(10.8)	
Male (%)	60.4	57.6	-2.8
Married (%)	66.2	86.6	20.4
Occupation (%)			
WC occupations	3.0	27.5	24.5
PC occupations	14.5	24.4	9.9
BC occupations	56.0	39.8	-16.2
Self-employed	26.5	8.3	-18.2
Ownership (%)			
State sector	11.1	54.1	43.0
Private sector	80.2	34.7	-45.5
Other sector	8.7	11.2	2.5
Contract type (%)			
Permanent or long-term	40.8	76.5	35.7
Short-term or no contract	59.2	23.5	-35.7
Region (%)			
East	53.2	53.9	0.7
Central	29.0	31.2	2.2
West	17.8	14.9	-2.9
Number of observations	11,228	10,930	

Note: Standard deviations are in parentheses.

Table 2: First and Current Jobs' Characteristics for Migrant Movers

	First Job	Current Job	Difference in Mean
	(1)	(2)	(3) = (2) - (1)
Monthly wage (yuan)	957.2	1715.7	758.5
	(654.7)	(1242.8)	
Monthly hours worked	246.4	250.4	4.0
	(58.2)	(66.1)	
Hourly wage (yuan)	4.1	7.2	3.1
	(3.1)	(4.9)	
Occupation (%)			
WC occupations	2.0	3.0	1.0
PC occupations	12.8	17.1	4.3
BC occupations	80.8	59.8	-21.0
Self-employed	4.4	20.1	15.7
Ownership (%)			
State sector	9.9	10.4	0.6
Private sector	81.5	80.4	-1.1
Other sector	8.6	9.2	0.5
Contract type (%)			
Permanent or long-term	29.7	44.1	14.4
Short-term or no contract	70.3	55.9	-14.4
Number of observations	4,122	4,122	

Note: Standard deviations are in parentheses.

Table 3: Monthly Wages of Migrants by Schooling and Over Time

	Primary School	Middle School	High School	College
First job	947.0	932.8	986.7	1032.3
	(744.7)	(640.2)	(657.5)	(572.7)
Current job	1567.6	1652.8	1815.5	2013.0
	(1278.5)	(1017.2)	(1513.5)	(1294.0)
Average years since migration	11.4	9.6	7.7	6.1
Annual growth	1.05	1.06	1.08	1.12
Number of observations	455	2,130	1,294	243

Note: Standard deviations are in parentheses.

Table 4: Occupational Distribution of Migrants by Schooling and Over Time

	Age at first migration 16-20					Age at first migration 21-59				
	WC	PC	BC	Self-emp.	Obs.	WC	PC	BC	Self-emp.	Obs.
First job										
All	1.5	13.7	82.2	2.7	2,326	2.8	11.6	79.0	6.6	1,796
Primary school	0.0	6.3	88.0	5.6	142	1.3	3.8	85.3	9.6	313
Middle school	0.6	9.1	87.1	3.2	1,237	1.9	7.4	83.5	7.2	893
High school	2.7	19.2	76.5	1.6	860	3.5	14.3	77.2	5.1	434
College	4.6	35.6	58.6	1.2	87	9.6	43.6	44.9	1.9	156
Current job										
All	3.2	20.3	59.9	16.6	2,326	2.8	12.9	59.7	24.6	1,796
Primary school	1.4	11.3	58.5	28.9	142	0.6	5.1	67.1	27.2	313
Middle school	2.3	14.0	64.2	19.6	1,237	1.6	8.6	62.0	27.8	893
High school	4.0	28.6	56.1	11.4	860	3.2	18.4	59.9	18.4	434
College	12.6	42.5	37.9	6.9	87	12.8	37.8	31.4	18.0	156

Table 5: Regression Analysis of Hourly Wage for Pooled Urban and Migrant Workers

	(1)	(2)	(3)	(4)
Constant	0.9148***	0.8765***	0.9647***	0.9191***
	(0.0297)	(0.0281)	(0.0310)	(0.0294)
Years of schooling (EDU)	0.0720***	0.0495***	0.0716***	0.0492***
	(0.0017)	(0.0017)	(0.0017)	(0.0017)
Potential experience (EXP)	0.0198***	0.0174***	0.0157***	0.0141***
	(0.0017)	(0.0016)	(0.0018)	(0.0017)
EXP squared	-0.0005***	-0.0005***	-0.0004***	-0.0004***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Male	0.2175***	0.2108***	0.2128***	0.2069***
	(0.0076)	(0.0074)	(0.0077)	(0.0074)
Married	0.0935***	0.0675***	0.0818***	0.0591***
	(0.0128)	(0.0124)	(0.0129)	(0.0125)
Central	-0.0197*	-0.0295***	-0.0162	-0.0263**
	(0.0113)	(0.0110)	(0.0113)	(0.0110)
East	0.4032***	0.3764***	0.4064***	0.3792***
	(0.0101)	(0.0099)	(0.0101)	(0.0099)
Year 2009	0.1173***	0.1136***	0.1152***	0.1122***
	(0.0074)	(0.0071)	(0.0074)	(0.0071)
WC occupations		0.3509***		0.3500***
		(0.0120)		(0.0120)
PC occupations		0.1560***		0.1550***
		(0.0095)		(0.0095)
Self-employment		0.2281***		0.2200***
		(0.0133)		(0.0134)
Long term (LT) contract		0.2055***		0.2028***
		(0.0087)		(0.0087)
State sector		0.1352***		0.1361***
		(0.0094)		(0.0094)
Other sector		0.0998***		0.0986***
		(0.0121)		(0.0121)
Migrant	-0.3680***	-0.2543***	-0.4598***	-0.3277***
	(0.0100)	(0.0101)	(0.0156)	(0.0152)
(Migrant) (YSM)			0.0195***	0.0155***
			(0.0026)	(0.0025)
(Migrant) (YSM^2)			-0.0007***	-0.0005***
			(0.0001)	(0.0001)
No. of observations	22,158	22,158	22,158	22,158
Adjusted R-squared	0.383	0.436	0.385	0.437

Note: Robust standard errors are in parentheses. * p<0.10, ** p<0.05, *** p<0.001.

Table 6: Migrant and Urban Workers' Wage Differences: By Worker Characteristics

	A. Overall			
	Wage difference at time of arrival (%) (1)	Average wage differences (%) (2)	Average YSM (3)	Wage convergence rate ((1)-(2))/(3)
All workers	46.0	36.8	8.03	1.15
By gender				
Male	50.0	41.2	8.79	1.00
Female	41.2	31.5	6.87	1.41
By marital status				
Married	53.3	40.9	10.25	1.21
Single	28.7	21.0	3.67	2.10
By education				
High school and above	38.7	36.9	5.98	0.30
Middle school and below	50.3	35.9	8.6	1.67
By region				
East	50.5	41.6	7.56	1.18
Central	40.1	30.7	8.44	1.11
West	39.8	31.8	8.77	0.91
	B. Within sector			
	Wage difference at time of arrival (%) (1)	Average wage differences (%) (2)	Average YSM (3)	Wage convergence rate ((1)-(2))/(3)
All workers	32.8	25.4	8.03	0.92
By gender				
Male	35.9	27.7	8.79	0.93
Female	28.6	23.1	6.87	0.80
By marital status				
Married	39.1	28.5	10.25	1.03
Single	19.2	13.5	3.67	1.55
By education				
High school and above	25.8	24.1	5.98	0.28
Middle school and below	38.1	26.0	8.6	1.41
By region				
East	35.9	29.5	7.56	0.85
Central	23.3	15.1	8.44	0.97
West	33.2	26.3	8.77	0.79

Table 7: Regressions Using Pooled Urban and Migrant Workers with Different Coefficients

Variable	(1)	(2)	(3)	(4)	(5)	(6)
Constant	0.5489***	0.5538***	0.5498***	0.5557***	0.5647***	0.5632***
	(0.0451)	(0.0418)	(0.0451)	(0.0417)	(0.0437)	(0.0405)
Years of schooling (EDU)	0.0876***	0.0544***	0.0876***	0.0544***	0.0869***	0.0540***
	(0.0025)	(0.0025)	(0.0025)	(0.0025)	(0.0025)	(0.0025)
Potential experience (EXP)	0.0216***	0.0178***	0.0216***	0.0178***	0.0205***	0.0175***
	(0.0027)	(0.0024)	(0.0027)	(0.0024)	(0.0020)	(0.0019)
EXP squared	-0.0005***	-0.0004***	-0.0005***	-0.0004***	-0.0005***	-0.0004***
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0000)	(0.0000)
Male	0.2621***	0.2291***	0.2621***	0.2290***	0.2634***	0.2300***
	(0.0116)	(0.0109)	(0.0116)	(0.0109)	(0.0116)	(0.0109)
Married	0.1674***	0.1248***	0.1673***	0.1247***	0.1754***	0.1284***
	(0.0213)	(0.0200)	(0.0213)	(0.0200)	(0.0199)	(0.0189)
Central	-0.0262	-0.0515***	-0.0262	-0.0514***	-0.0262	-0.0516***
	(0.0175)	(0.0165)	(0.0175)	(0.0165)	(0.0175)	(0.0165)
East	0.4576***	0.4201***	0.4576***	0.4201***	0.4575***	0.4200***
	(0.0161)	(0.0153)	(0.0161)	(0.0153)	(0.0161)	(0.0153)
Year 2009	0.1165***	0.1168***	0.1144***	0.1116***	0.1147***	0.1118***
	(0.0113)	(0.0105)	(0.0074)	(0.0071)	(0.0074)	(0.0071)
WC occupations		0.3430***		0.3427***		0.3429***
		(0.0142)		(0.0142)		(0.0142)
PC occupations		0.1899***		0.1897***		0.1900***
		(0.0140)		(0.0140)		(0.0140)
Self-employment		0.4794***		0.4797***		0.4794***
		(0.0279)		(0.0279)		(0.0278)
Long term (LT) contract		0.3614***		0.3617***		0.3616***
		(0.0157)		(0.0157)		(0.0157)
State sector		0.1455***		0.1455***		0.1461***
		(0.0129)		(0.0129)		(0.0129)
Other sector		0.1223***		0.1225***		0.1224***
		(0.0185)		(0.0185)		(0.0185)

Migrant	0.2581***	0.2521***	0.2112***	0.2177***	0.2938***	0.2831***
	(0.0548)	(0.0519)	(0.0714)	(0.0686)	(0.0752)	(0.0722)
(Migrant) (YSM)	0.0267***	0.0240***	0.0312***	0.0276***	0.0230***	0.0220***
	(0.0028)	(0.0027)	(0.0034)	(0.0033)	(0.0035)	(0.0034)
(Migrant) (YSM^2)	-0.0008***	-0.0007***	-0.0008***	-0.0007***	-0.0008***	-0.0008***
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
(Migrant) (EDU)	-0.0357***	-0.0104***	-0.0358***	-0.0106***	-0.0315***	-0.0077**
	(0.0034)	(0.0034)	(0.0034)	(0.0034)	(0.0032)	(0.0032)
(Migrant) (EXP)	-0.0091**	-0.0056	-0.0094***	-0.0058*	0.0000	0.0000
	(0.0037)	(0.0035)	(0.0037)	(0.0035)	(0.0000)	(0.0000)
(Migrant) (EXP^2)	0.0000	-0.0000	0.0000	-0.0000	0.0000	0.0000
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0000)	(0.0000)
(Migrant) (Male)	-0.1059***	-0.0713***	-0.1057***	-0.0710***	-0.1083***	-0.0726***
	(0.0153)	(0.0148)	(0.0153)	(0.0148)	(0.0152)	(0.0148)
(Migrant) (Married)	-0.1523***	-0.1149***	-0.1506***	-0.1134***	-0.1638***	-0.1190***
	(0.0266)	(0.0254)	(0.0266)	(0.0254)	(0.0236)	(0.0228)
(Migrant) (Central)	0.0204	0.0446**	0.0204	0.0446**	0.0203	0.0446**
	(0.0228)	(0.0220)	(0.0228)	(0.0220)	(0.0228)	(0.0220)
(Migrant) (East)	-0.1008***	-0.0865***	-0.1014***	-0.0868***	-0.1020***	-0.0871***
	(0.0205)	(0.0199)	(0.0205)	(0.0199)	(0.0205)	(0.0199)
(Migrant) (Year 2009)	-0.0019	-0.0087				
	(0.0148)	(0.0141)				
(Migrant) (WC)		-0.0078		-0.0088		-0.0056
		(0.0305)		(0.0305)		(0.0305)
(Migrant) (PC)		-0.1371***		-0.1368***		-0.1359***
		(0.0187)		(0.0187)		(0.0187)
(Migrant) (Self-employment)		-0.3811***		-0.3819***		-0.3809***
		(0.0317)		(0.0316)		(0.0316)
(Migrant) (LT contract)		-0.2553***		-0.2561***		-0.2556***
		(0.0185)		(0.0185)		(0.0185)
(Migrant) (State sector)		-0.0569***		-0.0574***		-0.0584***
		(0.0193)		(0.0193)		(0.0193)
(Migrant) (Other sector)		-0.0092		-0.0091		-0.0092

		(0.0238)		(0.0238)		(0.0238)
(Migrant) (cohort 1990-1999)			-0.0050	-0.0085	-0.0044	-0.0082
			(0.0362)	(0.0357)	(0.0363)	(0.0357)
(Migrant) (cohort 2000-2009)			0.0363	0.0236	0.0362	0.0235
			(0.0445)	(0.0439)	(0.0446)	(0.0439)
(Migrant) (Age at first migration)					-0.0080***	-0.0057***
					(0.0011)	(0.0010)
No. of observations	22,158	22,158	22,158	22,158	22,158	22,158
Adjusted R-squared	0.395	0.451	0.395	0.451	0.395	0.451

Note: Robust standard errors are reported in parentheses. * p<0.10, ** p<0.05, *** p<0.001.

Table 8: Sample Statistics for Urban Workers without and with Hukou Conversion

	All Urban Workers	Without Hukou Conversion	With Hukou Conversion
Monthly wage (yuan)	2457.7	2418.2	2608.4
	(1856.0)	(1799.8)	(2049.4)
Monthly hours worked	181.0	180.2	184.5
	(39.3)	(39.0)	(40.5)
Hourly wage (yuan)	14.2	14.0	14.8
	(10.9)	(10.6)	(12.1)
Age	39.9	40.2	38.6
	(9.6)	(9.8)	(8.7)
Years of schooling	12.2	12.3	11.9
	(3.2)	(3.1)	(3.5)
Years of potential experience	21.2	21.5	20.1
	(10.8)	(11.0)	(10.0)
Male (%)	57.6	58.1	55.6
Married (%)	86.6	85.6	90.3
Occupation (%)			
WC occupations	27.5	27.5	27.3
PC occupations	24.4	24.9	22.4
BC occupations	39.8	39.6	40.9
Self-employed	8.3	8.0	9.4
Ownership (%)			
State sector	54.1	54.3	53.6
Private sector	34.7	34.2	36.5
Other sector	11.2	11.5	9.9
Contract type (%)			
Permanent or long-term	76.5	77.6	72.3
Short-term or no contract	23.5	22.4	27.7
Region (%)			
East	53.9	53.1	57.2
Central	31.2	31.0	31.9
West	14.9	15.9	10.9
Number of observations	10930	8656	2274

Note: Standard deviations are in parentheses.

Table 9: Decomposition of Migrants' Wage Growth

Sources of wage growth	All Migrants		High school and above	
	Change in log wage	Contribution to total change (%)	Change in log wage	Contribution to total change (%)
Observed total change	0.5866	100	0.6282	100.00
Due to factor returns and sector premiums	0.3819	65.10	0.3355	53.41
Constant	0.1618	(27.58)	0.3601	(57.32)
Schooling	0.1205	(20.54)	-0.1028	(-16.36)
Experience	-0.0233	(-3.97)	-0.0217	(-3.45)
Gender	0.0315	(5.37)	0.0046	(0.73)
Marital Status	0.0379	(6.46)	0.0405	(6.45)
Region	0.0900	(15.34)	0.0747	(11.89)
Occupation	-0.0236	(-4.02)	-0.0043	(-0.68)
Ownership	-0.0017	(-0.29)	0.0034	(0.54)
Tenure	-0.0112	(-1.91)	-0.0190	(-3.02)
Due to worker characteristics and reallocation	0.2047	34.90	0.2927	46.59
Experience	0.1479	(25.21)	0.2105	(33.51)
Occupation	0.0380	(6.48)	0.0530	(8.44)
Ownership	0.0010	(0.17)	0.0026	(0.41)
Tenure	0.0178	(3.03)	0.0266	(4.23)