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## Glass Ceiling Effect in Urban China: Wage Inequality of Rural-Urban Migrants during 2002-2007

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## ABSTRACT

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# Glass Ceiling Effect in Urban China: Wage Inequality of Rural-Urban Migrants during 2002-2007\*

The paper studies the levels and changes in wage inequality among Chinese rural-urban migrants during 2002-2007. Using data from two waves of national household surveys, we find that wage inequality among migrants decreased significantly between 2002 and 2007. Our analysis on the wage distribution further shows that the high-wage migrants experienced slower wage growth than middle-and low-wage migrants – a primary cause of declining inequality of migrants. By using distributional decomposition methods based on quantile regression, we find that overall between-group effect dominates in the whole wage distribution, which means that the change in returns to the characteristics (education, experience and other employment characteristics) plays a key role, but on the upper tails of the wage distribution, the within group effect (residual effect) dominates, implying that the unobservable factors or institutional barriers do not favor the migrants at the top tail of the wage distribution. We also study wage differential between migrants and urban natives, and find that though the wage gap is narrowed, gap at upper wage distribution is becoming bigger. Overall, the results suggest that there exists strong “glass ceiling” for migrants in urban labor market.

**JEL Classification:** J30, J45, J61

**Keywords:** rural to urban migrants, wage inequality, quantile decomposition, China

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## I. Introduction

China's burgeoning economic growth and increasing labor demand in urban areas, have resulted in a historically unprecedented surge of urbanization. More and more of the rural population has been joining this exodus to the cities, in search of a better life. According to the National Bureau of Statistics of China (NBS), there were around 275 million rural-to-urban migrants (hereafter referred to as "migrants") in 2014, which could be the largest population movement within a country in modern human history.

The phenomenon of the great migration has attracted significant attention from academics, the public and both the central and local governments, because which is related with so many economic issues such as labor market reform, industrial restructure and competitive advantages in international trade etc. Despite the general recognition that it is important to have a better understanding it, this group had been almost omitted in most Chinese official statistics until recently.<sup>1</sup>

Another important social phenomenon during this period has been the widening income and wage distributions in urban China, one of the most remarkable shifts in the structure of labor compensation in the Chinese labor market since economic reform began in China in 1979.

Increasing inequality and large scale rural-urban migration are two of the most important phenomena in contemporary labor market of China. Numerous studies cover each of these issues separately, but few investigate both issues. For example, there are many studies on the Chinese rural-urban migration. Some researchers focus on the migration decisions, including Hare (1999 and 2002) and Zhao (1999 and 2003), and others examine the impact of migration on the source communities (e.g., Taylor, Rozelle and de Brauw, 2003; Du, Park and Wang, 2005; and de Brauw and Giles, 2008). Another group of studies focus on labor market segregation between urban natives and migrants in terms of wages, welfare and other aspects, as done by Meng and Zhang (2001), Knight and Yueh (2008), Demurge et al (2009) and Deng and Li (2009) and Zhu(2015). These papers find that migrant workers work more hours and receive less pay than urban natives. This gap is only partially explained by differences in their work-related characteristics and can mostly be attributed to the differing returns to endowments and other unobservable factors, generally assumed to be “discrimination” or “labor market segmentation” in China.

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<sup>1</sup> The National Bureau of Statistics (NBS) in China had previously conducted household surveys based on the Household Registration System, i.e. the *hukou system* for many years. Migrants were not systematically covered in this framework until 2013. To fill the gap, the NBS has conducted another specific survey based on rural households in source areas to cover rural-urban migrants every year since 2009. The official Chinese government labor statistics (e.g. on unemployment, wages and social security) did not cover migrants living in the urban destinations until 2008.

Income inequality has generally been on the rise in China since 1979. The unequal income distribution is a hotly debated topic in Chinese news media, policy circles and academia.<sup>2</sup> Even though it has been widely observed and extensively examined by researchers, data availability limits many studies to investigate inequality among migrants. The picture of inequality in China is incomplete in the absence of good information on the state of inequality among the 275 million migrants; any policy discussion and formulation should therefore take this group into consideration.

To fill this gap in the literature, this paper studies the levels and changes in wage inequality among migrants between 2002 and 2007, compares inequality among migrants with that among urban natives and investigates the sources and causes behind these trends. A deeper understanding of this phenomenon could be important for both academic and policy making purposes.

To our knowledge there are only a few studies related to our paper. Kanbur and Riskin (2008) uses the migrant sample in the 2002 wave of the China Household Income Project, and provides evidence that inequality among migrant households was greater than inequality among both rural and urban households in 2002. Their study focuses on inequality at the national level, so they do not dig deeper into their findings on migrants. The fact that they only have one cross-sectional dataset from 2002 also limits the scope of their study, making it impossible for them to investigate the changes in inequality among migrants over time. Qu and Zhao (2014) observes that wage inequality continued to increase among urban natives between 2002 and 2007, whereas wage inequality among migrants decreased over the same period, but they do not provide further analysis on their findings. Mignani and Zhu(2012) specifically analyze the gender wage gap among rural-urban migrants in China using the CHIP 2002 data. Meng and Zhang (2001), Knight and Yueh (2008), Demurge et al (2009), Deng and Li (2009) and Zhu(2015) mostly focus on the wage differentials between urban workers and rural migrants in urban labor market, they does not touch the inequality among migrants.

Following the classical human capital theory by Mincer (1974), wage distribution can mostly be explained by variables linked to a standard human capital model, such as education and experience. Many studies such as Juhn, Murphy and Pierce (1993), Autor, Katz and Kearney (2005) and Lemieux (2006), however, show that wage inequality within a group of workers with the same

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<sup>2</sup> Numerous papers have also been produced on inequality in China. For example, Gustafsson and Li (2002), Morduch and Sicular (2002) and Benjamin, Brandt and Giles (2005) investigate inequality in rural China. Knight and Song (2003) study the urban inequality over 1988-1995, Tsui (1993) and Kanbur and Zhang (1999) examine regional inequality in China, Knight and Song (1999) and Sicular et al (2007) investigate the urban-rural income gap and Ravallion and Chen (2007) provide a comprehensive study on inequality and poverty in China. Many more studies can be found, such as those by Zhao et al (1994), Zhao, Li and Riskin (1999) and Li, Sicular and Gustafsson (2008), all of which use China Household Income Project (CHIP) data, in addition to other research found in the symposium on Chinese inequality in the December 2006 issue of the *Journal of Comparative Economics*.

level of education and experience, which is called “residual inequality” in the literature, explains most of the growth in overall wage inequality of United States. Several studies on wage inequality in urban China, such as those by Xing and Li (2012) and Meng et al (2012), also show that residual inequality is very important to explain the wage dispersion of urban natives.

In this paper we take residual inequality seriously. Residual inequality among migrants could be even greater than that in other countries and urban natives in China because it reflects major unobservable skills or institutional factors that may significantly impact migrant wages. For example, China has experienced a rather long period of institutional segmentation between rural and urban labor markets as a result of the *hukou* household registration system. While the importance of *hukou* system is getting smaller, it still affects migrants in many ways and hampers their assimilation in urban China. Even if migrants had the same level of education, working experience, and other observable employment characteristics as their urban counterparts, migrants are unlikely to obtain overall remuneration that is comparable to urban natives.

To take these unobservable factors into account, we follow the framework suggested by Autor, Katz and Kearney (2005, hereafter AKK) to decompose changes in wage inequality into a between-group price effect (price effect), a within-group residual price effect (residual effect) and a labor force composition effect (endowment effect). We perform this decomposition across the wage distribution, allowing us to determine which component dominates changes in wage inequalities during our period of study. In order to decompose the change in the wage inequality on whole distribution across year, we also extend the AKK method into a framework tackling to the change of wage differentials suggested by Smith and Welch (1989).

Our paper is also related with another important topic, which is whether China has now reached the Lewis turning point. Lewis turning point was proposed by Noble Prize winner Aurther Lewis in the classical dual development model to describe a situation that there is no relative or absolute surplus of labor in rural area to migrate to urban area. It indicates that a certain developing country has entered to a new developing stage. Academics and policy makers in China have not reach a consensus about this hotly debated issue yet.<sup>3</sup>

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<sup>3</sup> Please refer to a symposium in a special issue of China Economic Review on this topic. Fleisher, B., R. Fearn and Y. Zhen (2011) make a very good introduction to the theoretical implication and comprehensive summary of empirical studies on the topic in the editorial. Specifically, based on some pieces of evidence that rural to urban migrant wages rise up significantly since 2003, some researchers hold positive point about it (Cai,2008 and Zhang,2011). Some others do not agree with it and show some evidence that there is still large-scale surplus labor in rural area (Golly and Meng, 2011). Knight et al (2011) make a compromise and present some evidence to support both views. They interpret that there are some institutional constrains to impeding rural to urban migrants access to the goods and secure job, housing, public services, which creates difficulties for them living in urban areas and in turn to make both phenomenon observed.

But most studies seldom discuss the wage distributions of the migrants and urban natives and their interactions with labor market. Ignoring the distribution of wage and its changes among migrant and urban natives could lead to incomplete knowledge about the wage process in Chinese labor market. If the wages of migrants increase mainly from special segments like higher end of the wage distribution, then one can infer that the lower end labor market for migrants is competitive during the time. This competition combined with the surplus of low quality of labor left in rural areas implies that there should be little capacity in urban labor market to accommodate more low-end migrants holding other factor fixed. So the knowledge on the wage inequalities among migrants and urban natives, and between these two groups will help us to understand the labor market dynamics in China better.

From our analysis, the following findings emerged. First, both migrants and urban natives enjoyed significant wage increases between 2002 and 2007.<sup>4</sup> The average monthly wage rose by 61.59% from urban natives and 62.31% for migrants, while the increases in mean hourly wages were about 58.46% and 70.09% for urban natives and migrants, respectively. The wage gap between the two groups narrowed because migrant wages grew faster.

Second, migrant wages did not increase uniformly across the wage distribution. High-wage migrants experienced slower wage growth than middle- and low-wage migrants, which we interpret as the first aspect of wage “glass ceiling” effect for migrants.<sup>5</sup> The wage gap between migrants and urban natives is also larger in the top wage distribution, and this is the second aspect “glass ceiling” effect. These "glass ceiling" effects can partly explain that inequality among migrants decreased significantly from 2002 to 2007.

Third, our decomposition on wage changes among migrant across time shows that between-group differences in term of returns to migrants' human capital (such education and experience) and employment characteristics (such as industries and ownerships of employment) dominate across much of the wage distribution, whereas residual within-group effects dominate at the higher end of the wage distribution. The importance of the residual effect among higher-wage migrants suggests the presence of unobservable factors or institutional barriers which impede these migrants.

Last but not least, our distributional decomposition to the change of wage inequalities shows that the changes in returns to characteristics can explain more for the changes of inequalities, especially for the higher-wage groups. Moreover, dividing the changes in returns into the change in

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<sup>4</sup> All wages in this paper are deflated to 2002 price level by provincial level CPI.

<sup>5</sup> It is worth noting that since we do not have a panel data, the high wage migrants in 2002 could be no longer so in 2007.



between-group (price) effects and the one in within-group (residual) effects, we find that the change in within-group effect play a dominate role in explanations of the change in wage differentials.

The remainder of the paper is organized as follows. Section II describes the datasets used in the paper. Section III documents the structure of wages, along with the level and changes in inequality between 2002 and 2007 among migrants, then it compares migrants with urban natives. Section IV introduces the decomposition method proposed by Autor, Katz and Kearney (2005). Section V presents the main decomposition results and discussions. Section VI concludes the paper.

## **II. The Chinese Household Income Project (CHIP) Data and Descriptive Statistics**

### **2.1 The CHIP data**

The data used in the paper come from two waves of the Chinese Household Income Project (CHIP), collected by the Institute of Economics of the Chinese Academy of Social Sciences with the support of the National Bureau of Statistics (NBS). The CHIP has been carried out in 1988, 1995, 2002 and 2007.<sup>6</sup>

Although each wave of the CHIP has very large samples in both urban and rural areas, the 1988 and 1995 waves did not cover migrants living in cities; the 2002 and 2007 waves have surveyed migrants in 28 cities across 12 provinces and 15 cities in 10 provinces, respectively. An individual is defined as a migrant if he or she is registered as a rural resident with rural *hukou* and has been living in the urban area for more than 6 months; accordingly, “urban natives” are identified by registration as urban resident with urban *hukou*.

Both waves record detailed household information from the respondents, such as income and expenditures, demographic characteristics, and work and employment information. We only use the urban and migrant samples in this paper, and construct a single repeated cross-section of data from these two waves. The final dataset covers migrants living in cities as well as urban natives in the same cities as the migrants.

Moreover, although CHIP 2002 and 2007 cover many cities in each wave, the coverage has changed substantially across the two waves. To ensure that our results are not contaminated by the change of sample composition across two years, we limited our sample covered in the same cities for both migrants and urban natives in 2002 and 2007, thus samples in following cities: Hefei, Zhengzhou, Wuhan, Wuxi, Guangzhou, Chongqing and Chengdu. Although our final sample is smaller compared to the original CHIP data and other nationwide survey, and only covers seven

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<sup>6</sup> For the details about the CHIP and its migrant survey, please refer to Li et al (2008).

cities, the distribution of these cities is across China.<sup>7</sup> However we should admit that our sample only covers limited number of cities; we should interpret the results in this paper with cautions.<sup>8</sup>

It is important to note that only those migrants with a fixed residence were sampled in 2002; migrants living in a dormitory or workplace such as a construction site were not included. The 2007 sample covered migrants living in a dormitory or workplace as well, so we have to exclude these observations to make the 2007 sample comparable to the 2002 sample as Knight et al (2012).<sup>9</sup>

Comparability is not a problem in the urban sample, since both the CHIP 2002 and 2007 survey teams carried out their urban surveys with the help of the NBS and drew their observations from the NBS sampling frame.

We further restrict the sample to men aged 16-60 and women aged 16-55, in line with the official male and female retirement ages. For the wage structure analysis, we retain employed individuals with a positive wage.<sup>10</sup> The measure of wage includes general wages, bonuses, allowances and remuneration in kind and net income for self-employed.<sup>11</sup> We also using the Consumer Price Index (CPI) published by NBS to adjust the nominal wages to the real one in the price level of 2002.

## 2.2 Summary statistics

Table 1 presents summary statistics on individual characteristics, work related variables, and wage information for both migrants and urban natives in 2002 and 2007. The table shows that the migrants earn much lower wages than urban natives in both years. Like in 2002, migrants are paid by 812 Chinese yuan for a month in average, which figure is nearly three quarters compared to

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<sup>7</sup> These cities belong to the developed coastal areas such as Wuxi in Jiangsu province, and Guangzhou in Guangdong province, the developing areas in the of China, such as Zhengzhou in Henan province, Hefei in Anhui province and Wuhan in Hubei province and less developed areas in the west of China, such as Chengdu in Sichuan province and Chongqing municipality.

<sup>8</sup> To ensure the robustness of our result, we also carry out robust tests based on the data covered the same provinces which includes more cities, and the result does not change very much. Please see the appendix figure 2 for details.

<sup>9</sup> After the sample restriction, we keep two third of migrants in our final sample. Appendix table 1 describes the summary statistics between the sample kept and the one dropped. In general, migrants in the sample kept have more education and experience, and in turns obtains more income than those dropped. It means that we make a left censoring sample for migrants. However, one of our main findings that high-wage migrants experienced slower wage growth than middle- and low-wage migrants leads us to believe that this left-censoring in our sample may not have an important effect on our main conclusion on the “glass ceiling” effect for migrants.

<sup>10</sup> We calculate the unemployment rate of migrants, but the number is quite small and is nearly the same in both periods, so we only analyzed the working sample.

<sup>11</sup> Our wage measure does not account for social benefits; these benefits related with work could be a crucial factor to the job taking decisions for workers. We will present results on social benefits in Table 3 and will discuss them later. The other concern about our measure to income is the missing of high income respondents from household survey as Wang & Woo (2011) suggested. However, since the wealthiest people in China are mostly urban natives, the underreporting or missing bias is more likely in urban survey. Then the bias may not be very serious for migrants who are our focus of analysis. The “glass ceiling” effect would be even bigger if there were no high-wage urban natives missing from the sample.

urban natives (1148 Chinese yuan). And wages increased significantly for both groups over this 5-year period: urban natives raw average monthly wages continue to increased from 1148 to 1845 Chinese yuan, while the corresponding increase among migrants was from 812.68 to 1352.54 Chinese yuan; their hourly wages also increased a lot among both urban natives (from 6.55 to 10.14 yuan per hour) and among migrants (from 2.9 to 5.28 yuan per hour).

Average weekly working hours for urban natives was 43.15 in 2002 and 44.57 in 2007. Average weekly working hours among migrants was very high in 2002 at 71.96 hours per week, a figure that decreased substantially to 64.43 hours per week in 2007.

In terms of gender, the percentage of females among the employed is similar between urban natives (56%) and migrants (55%). Migrants tend to be younger, although both groups were younger in the 2002 sample than in 2007. The average age of migrants was 34.67 in 2002 and 32.17 in 2007; the average age of urban natives was 40.7 in 2002 and 38.76 in 2007. This table also shows that migrants were more likely to be married and to be a minority in 2002. The percentages of married individuals and of minorities remained quite stable among urban natives remain over 2002 to 2007, while both of these percentages decreased among migrants during this period.

<Insert Table 1>

In terms of education, it is not surprising that migrants have less schooling than urban natives, although both groups saw significant increases in education levels between 2002 and 2007. The table also presents self-reported health status. The trend differs for these two groups: 92% of migrants reported being in good health in the 2002 sample, a share that declined to 86% in 2007; this figure increased among urban natives, from 65% in 2002 to 78% in 2007.

This table also summarizes information on work related variables. There are significant differences between migrants and urban natives.

### **III. Wage Inequalities of Migrants**

#### **3.1 Inequality between migrants and urban natives**

##### **3.1.1 Wage inequality**

Table 2 describes (monthly and hourly) wage differentials between urban natives and migrants in 2002 and 2007 at the mean and at different quantiles of wage distribution. First, urban natives unsurprisingly earn a higher monthly and hourly wage than migrants. The average differentials between two groups are 299.71 Chinese yuan in terms of monthly wage and 3.53

Chinese yuan in terms of hourly wage in 2002. These differentials continue to rise in 2007 to 478 yuan in monthly wage and 5.22 in hourly wage, respectively. However, wage ratio of urban natives to migrant, a relative measure of the differentials, decreased from 2002 (1.35 and 2.1 in terms of monthly and hourly wage, respectively) to 2007 (1.34 and 1.96). This fact suggests that though the absolute wage differential between two groups continued enlarging, wage of migrants increased relatively faster than that of urban natives from 2002 to 2007.

<Insert Table 2>

When extending our analysis from the gap at the mean to the ones at different quantiles, an interesting pattern emerged. Specifically, the differentials at the median and at the 90<sup>th</sup> quantile are larger than those at the 10<sup>th</sup> in 2002. In 2007, however, these two gaps in term of wage ratio show an entire different pattern: the ratio at median has declined from 1.43 to 1.26 in monthly wage and from 2.46 to 1.79 in hourly wage, while that at 90<sup>th</sup> quantile rise from 1.39 to 1.56 in monthly wage.

Figure 1 details the differentials in the logs of monthly and hourly wages across the entire wage distribution in 2002 and 2007. The differentials almost rise up along the quantiles roughly. As to the change from 2002 to 2007, the gap falls down on most quantiles except for that on the high end of distribution.

<Insert Figure 1>

The above simple statistical and graphical analyses indicate that migrants on the upper tails of wage distribution are relatively worse-off compared with their counterpart of urban natives and this pattern has become more pronounced from 2002 to 2007. This suggests that there may exist “glass ceiling” for migrants.<sup>12</sup>

### **3.1.2 Social benefits inequality**

An important component of compensation package is social benefits. Table 3 presents differentials in social benefits between migrants and urban natives, and we focus on unemployment insurance, pension and health insurance three programs. Not surprisingly, urban natives have enjoyed much more social benefits than migrants. In 2002, 41 percent of urban natives had unemployment insurance, 62 percent had retirement pensions and 66 percent had health insurance, while these numbers were 1 percent, 5 percent and 2 percent for migrants, respectively. The differentials in coverage rates for these three benefits between urban native and migrants were 40

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<sup>12</sup> We borrow the term "glass ceiling" from gender wage inequality studies. It is described a fact that women are paid less than men on the high end of wage distribution, which are very similar to what we see for migrant vs urban natives.

percent, 57 percent and 64 percent, respectively. From 2002 to 2007, the coverage rates of these three programs have increased for both urban natives and migrants. The last column of Table 3 shows difference in differences of these three coverage rates between urban natives and migrants across time. It suggests that migrants was greatly improved in health insurance coverage, while urban natives still enjoyed much better social benefits in unemployment insurance and pension.

<Insert Table 3>

### 3.2 Migrant wage inequality

Table 4 presents overall (monthly and hourly) wage inequality among urban natives and among migrants in 2002 and 2007. Monthly wages among urban natives and migrants both increased sharply, by about 62%, over the 5-year period. When looking at average hourly wages, the increase is much more among migrants (70%) than among urban natives (58%).

<Insert Table 4>

Table 4 also shows what happened to wage over the 5-year period using the Gini coefficient and Theil index. This approach yields crude but interesting result that the migrant and urban native segments of the population experienced very different changes in inequality over this period. Specifically, the Gini coefficient based on monthly wage increased by 0.01 from 2002 to 2007 for urban natives, but decreased by 0.04 for migrants during the same period. If we use hourly wage, the diverging inequality trends are even more pronounced: the Gini coefficient increased by 0.01 for urban natives and decreased by 0.06 for migrants. The Theil index shows similar pattern. In a word, wage inequality among urban natives increased slightly from 2002 to 2007, while that among migrants declined over this time frame.

To further explore the divergent trends along the distribution, we calculate Kuznets ratio. For the migrants, the ratio between 90<sup>th</sup> percentile to the median of the hourly wages distribution falls significantly (about 15% for monthly earnings and 8% for hourly earnings, respectively), which means the gap between the top and the middle decreased over time. While the ratio of median to 10<sup>th</sup> percentile of the wages distribution rose up, which indicates that the gap between the middles and the bottoms increased mildly (2% for monthly earnings and 4% for hourly earnings).<sup>13</sup>

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<sup>13</sup> For urban natives, the trend is opposite, as indicated by rising wage inequality up over the period. Specifically, the ratio between 90<sup>th</sup> percentile to the median of the wages distribution raised up more significantly (about 8% for monthly earnings and 13% for hourly earnings, respectively), which means the gap between top and middle segments of wages increased over time. While the ratio of median to 10<sup>th</sup> percentile of the wages distribution dropped down, in turn, which indicates that the gap between the middles and the bottoms decreased mildly (over -6% for monthly earnings and -9% for hourly earnings, respectively). In a summary, the increase of wages inequality for urban natives mainly comes from

### **3.3 Between-group inequality and within-group inequality among migrants**

The above descriptive statistics demonstrate that wage inequality increased among urban natives and decreased among migrants. And the wage inequality among migrants decreased greatly over the period mainly because the gap between higher segments of wage distribution fell down significantly. These statistics only pertain to the overall wage distribution and do not tell us much about within-group differences and between-group differences by education, experience and other employment characteristics.

As discussed in the introduction, many studies around the world and on China show that residual inequality, i.e. wage inequality within a group of workers with the same level of education and experience, is very important to explain the wage dispersion. Residual inequality among migrants could be even greater than that in other countries and urban natives in China because it reflects major unobservable skills or institutional factors that may significantly impact migrant wages.

#### **3.3.1 Between-group inequality**

Table 5 gives us a first look at this issue by examining wage changes by experience and education level. Panel A of the table shows a very interesting pattern: more experienced urban natives see smaller wage increases. This implies that the situation of the younger cohort is improving faster than that of the older cohort. As to migrants the table shows a different but milder pattern: more experienced migrants are paid more but the premium is mild.

<Insert table 5>

We also document wage changes by level of education in panel B of table 5. It shows that the wages of urban natives in lower education level like less than primary school and primary school have more increases than those in other education level in measures of both hourly and monthly wages. For migrant part, their wages increase less as education level rise in a mild way except for college and above group.

#### **3.3.2 Within-group (residual) inequality**

To measure the unexplained residual factors behind inequality within the migrant and urban native groups, we follow AKK method of Autor, Katz, and Kearney (2005), and begin by estimating the Mincerian wage equations for the two groups in 2002 and 2007:

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the fact that the gap between the higher and middle segments of wage distribution increased over the period. This evidence is corroborated by recent several studies on urban wage inequality in China, including Meng (2012) and Ge and Yang (2012).

$$\ln w_{ist} = \alpha_{st} + \beta_{1st} S_{ist} + \beta_{2st} E_{ist} + \beta_{3st} E_{ist}^2 + \gamma_{st} X_{ist} + \varepsilon_{ist} \quad (1)$$

where  $\ln w_{ist}$  is the log hourly wage of individual  $i$  in  $s$  group at time  $t$ ,  $s = \text{urban or migrant}$ ,  $t = 2002 \text{ or } 2007$ ,  $S_{ist}$  represents the schooling level of  $i$ ,  $E_{ist}$  and  $E_{ist}^2$  are the potential working experience and its square of the individual  $i$ , and  $X_{ist}$  is a vector of control variables including individual demographic characteristics such as gender, minority, marriage status, self-reported health and work characteristics, industry, ownership and city dummies.

Table 6 presents the results of the Mincerian wage equations for migrants and urban natives in 2002 and 2007. The human capital variables (education and potential experience) have large coefficients for both migrants and urban natives.<sup>14</sup>

<Insert Table 6>

The groups differ in their returns to schooling over 2002 to 2007. This rate decreased for urban natives and increased for migrants over the period, indicating a convergence in the returns to education for migrants and urban natives. A similar pattern appears with respect to returns to experience. These two findings suggest that the price of human capital in the Chinese labor market is increasingly governed by the one price rule. Based on above regression we obtained the residuals for groups in different years, and then we calculate the mean and inequality measure in term of ratios of 90<sup>th</sup> to 10<sup>th</sup>, 90<sup>th</sup> to 50<sup>th</sup> and 50<sup>th</sup> to 10<sup>th</sup> percentiles.

Table 7 presents these measures of income inequality of migrant and urban natives in 2002 and 2007. Residual I is calculated based on residuals obtained from the specification of the standard Mincerian wage equations, thus only controlling education and experience variables. Residual II is calculated based on residuals obtained from the specification of controlling more variables besides education and experience.

Inequality in table 7 and overall inequality in table 2 exhibit a similar trend. In other words, inequality decreased among migrants and increased among urban natives. The magnitude of change is considerably less in table 2, which suggests that the changes in residual inequality only account for a small share of the changes in overall inequality among migrants. However, the change of ratio of 90<sup>th</sup> to 50<sup>th</sup> on migrant wage distribution is larger than that of 50<sup>th</sup> to 10<sup>th</sup>, which suggests that high income group on wage distribution is worse-off.

<Insert Table 7>

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<sup>14</sup> For the sake of brevity, we only report the estimation coefficients on male, education, experience and experience squared in the regression. Detailed results are showed in Appendix Table 2.

## IV. Analytical Framework

To understand the factors behind wage changes among migrants and urban natives, a standard analytical framework was proposed in Oaxaca (1973) and Blinder (1973) (hereafter OB), which allows us to decompose the wage gap between migrants and urban natives and the increase of wages over this 5-year period into *price effects* (resulting from changes in coefficients) and *endowment effects* (resulting from changes in the characteristics). The standard OB decomposition is only useful for decomposing the gap at mean. Since our goal is to analyze changes in inequality rather than changes in average wages, we need a tool to analyze the entire wage distribution.

### 4.1. AKK decomposition method

We opted for a quantile decomposition method, such as the one proposed by Machado and Mata (2005) (hereafter MM). We also wish to account for residual inequality, which can be done an extended version of MM by Autor, Katz and Kearney (2005), AKK method. Specifically, in this paper, we use the AKK method to partition changes in the wage distribution into three components: the coefficients on median wages capture changes in returns to endowments, the residual captures unobserved within-group factors and education, experience and other employment variables are also included to reflect changing labor market conditions on the supply side between 2002 and 2007. A number of other approaches have been used to account for the entire wage distribution when analyzing wage inequality, such as the JMP method proposed by Juhn, Murphy and Pierce (1993) and the DFL method developed by Dinardo, Fortin and Lemieux (1996). The MM and AKK methods have four advantages when constructing a “counterfactual” distribution. First, the “predicted” or “counterfactual” distribution based on the MM method should be more “accurate” because it allows the estimated coefficients to be varied over quantiles by applying a quantile regression, while the coefficients in the JMP method cannot be like that because it is estimated by an OLS regression. Second, under the convenient partial equilibrium assumption, the MM method can be used to study the effect of changing both composition (endowment) and coefficient (price) on the distribution of wages. Third, the MM method can be easily extended to study residual inequality and readily provides a “uniform and consistent” treatment of both overall inequality and residual inequality. Forth, the JMP and DFL approaches are both naturally built into the MM quantile model. Last but not least, the AKK method is a very natural extension of MM which accounts for the residual. Please see Autor, Katz and Kearney (2005) for detailed discussions. These advantages lead us to primarily base our analysis on the AKK approach.



AKK decomposition method can be described as follows.

Let  $Q_\theta(w|x)$  for  $\theta \in (0,1)$  denote the  $\theta^{th}$  quantile of the distribution of the log of wage ( $w$ ) given the vector of covariates  $x$ . The quantile regression equation is thus

$$Q_\theta(w|x) = x' \beta(\theta), \quad (2)$$

and the unconditional quantile distribution at time  $t$  for group  $i$  is

$$\hat{w}_{it}(\theta) = X_{it} \hat{\beta}'_{it}(\theta) \quad (3)$$

where the subscribe  $i$  denotes the wage distribution for the urban natives or migrants, and subscribe  $t$  denotes the wage distribution in  $t$  year, in our case, 2002 or 2007 respectively. Following Autor, Katz and Kearney (2005), we refer to the vector of coefficients estimated at the 50<sup>th</sup> quantile (the median) as  $\hat{\beta}^b(\theta) \equiv \hat{\beta}(0.5)$ ; this vector provides us with a measure of between-group inequality. We define within-group inequality as the difference between the estimated coefficient vector  $\hat{\beta}(\theta)$  and the median coefficient vector  $\hat{\beta}(0.5)$  as follows:

$$\hat{\beta}^w(\theta) \equiv [\hat{\beta}(\theta) - \hat{\beta}^b(\theta)] \text{ for } \theta \in (0,1) \quad (4)$$

In summary, the distribution of wages can be seen as a function of three components: the distribution of covariates (labor force composition),  $g(x)$ , the vector of between-group prices and the matrix of within-group (residual) prices. We thus define the wage distribution as

$$f(\hat{w}_{it}) \equiv f(g_{it}(x), \hat{\beta}_{it}^b, \hat{\beta}_{it}^w) \quad (5)$$

First, for each sample in  $t$  year and  $i$  groups, we estimate the quantile regression coefficients  $\hat{\beta}_{it}(\theta)$  for quantile  $\theta = 0.001, 0.002 \dots 0.999$  in addition to  $\hat{\beta}_{it}^b(\theta)$  the coefficients coming from a model fitting for the median, thus  $= 0.5$ . Here  $\hat{\beta}_{it}(\theta)$  and  $\hat{\beta}_{it}^b(\theta)$  are  $k \times m$  matrix of quantile regression in coefficients, where  $k$  is the number of elements in  $x$  and  $m$  is the number of quantiles estimated in  $\theta$ . Second, we calculate the residual price vector  $\hat{\beta}_{it}^w(\theta)$  using equation (3). Third, we draw simulated data by applying the price coefficients matrices  $\hat{\beta}_{it}^b(\theta)$  and  $\hat{\beta}_{it}^w(\theta)$  to  $g_{it}(x)$ . Then we can get the different unconditional distribution at different  $t$  and  $i$  and different coefficients.

Now we can use this unconditional distribution to construct counterfactual data points and then quantify these three groups of factors in each quantile.

Firstly, the overall change in wages by quantile between 2002 and 2007, denoted as  $\Delta Q_\theta^{change}$  and wage differentials between migrants and urban natives, denoted as  $\Delta Q_\theta^{gap}$  are as follows respectively

$$\Delta Q_\theta^{change} = Q_\theta(f_{i,2007}(w)) - Q_\theta(f_{i,2002}(w)) =$$

$$Q_{\theta} \left( f(g_{i,2007}(x), \hat{\beta}_{i,2007}^b, \hat{\beta}_{i,2007}^w) \right) - Q_{\theta} \left( f(g_{i,2002}(x), \hat{\beta}_{i,2002}^b, \hat{\beta}_{i,2002}^w) \right) \quad (6)$$

where the subscript  $i = urban \text{ or } migrant$  denotes as urban natives or migrants respectively.

$$\Delta Q_{\theta}^{gap} = Q_{\theta} \left( f_{u,t}(w) \right) - Q_{\theta} \left( f_{m,t}(w) \right) =$$

$$Q_{\theta} \left( f(g_{u,t}(x), \hat{\beta}_{u,t}^b, \hat{\beta}_{u,t}^w) \right) - Q_{\theta} \left( f(g_{m,t}(x), \hat{\beta}_{m,t}^b, \hat{\beta}_{m,t}^w) \right) \quad (7)$$

where the subscript  $u$  and  $m$  denotes urban natives and migrants and  $t = 2002 \text{ or } 2007$ .

Secondly, the change in wages on quantiles between 2002 and 2007 resulting from changes in the quantities of characteristics such as human capital (education, experience and health status) and other employment characteristics (industry, ownership, types of labor contracts) is:

$$\Delta Q_{i,\theta}^{change,x} = Q_{\theta} \left( f(g_{i,2007}(x), \hat{\beta}_{i,2007}^b, \hat{\beta}_{i,2007}^w) \right) - Q_{\theta} \left( f(g_{i,2002}(x), \hat{\beta}_{i,2002}^b, \hat{\beta}_{i,2002}^w) \right) \quad (8)$$

$$\Delta Q_{\theta,t}^{gap,x} = Q_{\theta} \left( f(g_{urban,t}(x), \hat{\beta}_{urban,t}^b, \hat{\beta}_{urban,t}^w) \right) - Q_{\theta} \left( f(g_{mig,t}(x), \hat{\beta}_{mig,t}^b, \hat{\beta}_{mig,t}^w) \right)$$

Thirdly, the increase in the price of human capital on the labor market between 2002 and 2007 leads to the following change in wages, by quantile:

$$\Delta Q_{\theta}^b = Q_{\theta} \left( f(g_{2007}(x), \hat{\beta}_{2007}^b, \hat{\beta}_{2007}^w) \right) - Q_{\theta} \left( f(g_{2002}(x), \hat{\beta}_{2002}^b, \hat{\beta}_{2002}^w) \right) \quad (9)$$

Finally, increases in the returns to unobservable factors, possibly driven by forces inherent to rural and urban labor market, are defined as leading to the following changes in wages between 2002 and 2007, by quantile:

$$\Delta Q_{\theta}^w = Q_{\theta} \left( f(g_{2007}(x), \hat{\beta}_{2007}^b, \hat{\beta}_{2007}^w) \right) - Q_{\theta} \left( f(g_{2002}(x), \hat{\beta}_{2002}^b, \hat{\beta}_{2002}^w) \right) \quad (10)$$

The total observed change is the sum of this decomposition:

$$Q_{\theta} = \Delta Q_{\theta}^x + \Delta Q_{\theta}^b + \Delta Q_{\theta}^w \quad (11)$$

This equation specifies the change in wages as resulting from three factors: the increase in human capital (education and experience) and other employment factors (industry, ownership and city), the rising market price of these characteristics and the increase of returns to unobservables.

## 4.2 A Distributional Smith and Welch decomposition method

In order to decompose the changes in wage inequalities in the whole distribution across time, we extend the AKK method into the framework of Smith and Welch (1989) (hereafter SW). The SW method originally is used to decompose the changes in wage gaps on the mean across time. Essentially, it applies OB decomposition twice to decompose the wage gaps between two groups across time (or the changes across time between two groups). Similarly, we apply AKK method twice to decompose gap between two groups and change across time for the wage distribution:

First we assume that the unconditional wage distribution for group  $i$  in year  $t$  are as equation (3), and carry out the following decomposition:

$$\Delta \widehat{w}_t(\theta) = X_{u,t} \widehat{\beta}'_{u,t}(\theta) - X_{m,t} \widehat{\beta}'_{m,t}(\theta) \quad (12)$$

After some calculations, the AKK decomposition can be extended to SW framework:

$$\begin{aligned} \Delta \widehat{w}_{2007}(\theta) - \Delta \widehat{w}_{2002}(\theta) = & \\ & (\Delta X_{2007} - \Delta X_{2002}) \widehat{\beta}'_{u,2007}(\theta) + (\Delta X_{2007} - \Delta X_{2002}) \widehat{\beta}'_{u,2007}(\theta) \\ & + \Delta X_{2002} (\widehat{\beta}'_{u,2007}(\theta) - \widehat{\beta}'_{u,2002}(\theta)) + \Delta X_{2002} (\widehat{\beta}'_{u,2007}(\theta) - \widehat{\beta}'_{u,2002}(\theta)) \\ & + (X_{m,2007} - X_{m,2002}) \Delta \widehat{\beta}'_{2007}(\theta) + (X_{m,2007} - X_{m,2002}) \Delta \widehat{\beta}'_{2007}(\theta) \\ & + X_{m,2002} (\Delta \widehat{\beta}'_{2007}(\theta) - \Delta \widehat{\beta}'_{2002}(\theta)) + X_{m,2002} (\Delta \widehat{\beta}'_{2007}(\theta) - \Delta \widehat{\beta}'_{2002}(\theta)) \end{aligned} \quad (13)$$

The first and the second terms, “within-group main effect” and “between-group main effect”, measure the change in the wage gap by the change in the difference of characteristics between urban natives and migrants across time, weighted by 2007 urban natives returns to unobservables and observables, respectively. They represent the components of the change of inequality from the change of characteristics differentials between two groups which are similar to the “endowment effect” in OB decomposition.

The third and the fourth terms, “within-group year effect” and “between group year effect”, measure the effect of a change in the wage gap due to an increase in urban natives returns to unobservable characteristic and those to observables, respectively, weighted by the difference of characteristic levels between two groups.

The fifth and the sixth terms, “within-group gap effect” and “between group year effect”, measure the additional change in the wage gap by the change in migrant characteristics, taking into account that migrants and urban natives returns to unobservables and observables differ in 2002. If migrant returns to unobservable or observables characteristics in 2002 are higher than urban native returns, then an increase of characteristics results in a decrease in the wage gap.

The seventh and the eighth terms, “coefficient effect”, measure the change in the wage gap by the changes in the differences of returns to unobservable or observables characteristics between two groups across time, weighted by 2007 migrant characteristics. They represent the components of the change of inequality from the change of returns differentials between two groups which is similar to the “price effect” in OB decomposition.

## **V. Empirical Results and Implications**

### **5.1 Overall wage inequalities decomposition**

Figure 3 shows the decomposition of wage differentials between migrant and urban native in 2002 and 2007 using AKK method. In 2002, the between-group effect and differences in the composition of urban natives and migrants both play an important role. The within-group effect is small across most percentiles, turns into negative on the top quantiles. The results suggest that the difference in within-group returns in 2002 is unimportant to the wage differentials between these two groups, while differences in the level and returns to the endowments both contribute significantly to the wage gap.

<Insert Figure 3>

In 2007, however, the most evident change is that the gap presents, instead of an inverse U shape in 2002, an increasing trend along the percentile. Speaking differently, the wage gap on bottom quantiles shrink while the one on top percentiles increase. It proves again that migrants on high end of the distribution get worse off and those of lower end get better off. The decomposition shows that between group effect still dominates on the whole distribution, while the component of differences in the characteristics decrease on most percentiles, except an increase only on the bottom of distribution. Within group effect rise up along the quantiles, and reach the top value which is larger than endowment effect on the top of distribution. It suggests that the increase of gap on the top tail due to a stable high level of returns to observable characteristics and a more prominent within-group effect.

Figure 4 shows the main results of the AKK decomposition to the increases of wage across time on the distribution. Although wages among migrants (in Panel A) have increased across the entire distribution, ones at the higher percentiles suffer a slower wage growth, which supports one aspect of “glass ceiling” effects.

<Insert Figure 4>

Decomposition shows that the between-group (median) effect of migrant dominates the other two effects, although the size of this effect tapers off somewhat along the wage distribution. The second important contributor is migrant composition, a factor whose importance increases along the wage distribution. The within-group (residual) effect is negative, which means that it tends to decrease, and is only relevant in the top quantiles.

The evidence showed above suggests that on the one hand most of migrant wage increase from 2002 to 2007 can attribute to the increase to the returns to observable characteristics, and the effect attenuate significantly along the wage quantiles. On the other hand the improvement of characteristics of migrants can explain the increase of wage for migrants much more along the quantiles of distribution. Last, a negative residual effect on the top percentile suggests that some unobservable factors prevent migrants with highest wage to earn more wage which they should have earn under the assumption that all migrants enjoy the same rate of wage increase across time.

Among urban natives (in panel B), the raw wages of urban natives rise fastest at the extremes of the income distribution. Decomposition shows that the between-group effect explains much of the change in wages. Labor force composition and within-group effects play a minor role, although their impacts are more important at the extremes of the income distribution. These evidences suggest that like migrants the returns to observable characteristics are also main driving force to wage increase for urban natives.

Figure 5 presents the results using SW version of AKK. First, an interesting pattern is that the change of wage gap between urban natives and migrants on lower quantiles of wage distribution is negative, only the ones at highest quantiles tend to be positive. It suggests that only the gap at high end of wage distribution increase across time. Otherwise, most percentiles of distribution drop significantly from 2002 to 2007. This again suggests that the “glass ceiling” effect exists for high wage migrants and more importantly the situation had deteriorated during the 5-year-period, which illustrates a double “glass ceiling” pattern which we discussed early.

<Insert Figure 5>

Using SW-AKK decomposition method, the total change of wage gap between the two groups can be decomposed into four parts as in equation (13). The change in coefficients or price effect dominates the change of total wage gap on the whole distribution, especially for that at the high end. We further decompose the coefficients effect into between-group and within-group (residual) effects. The results illustrate a very interesting pattern: although between-group return effect is pronounced on most percentiles of wage distribution, within-price effect turns from

negative to positive and totally dominated at the high end of wage distribution. It suggests that the increase of wage inequality across time at high percentile can be mostly attributed to the change of within-group (residual) effect.

## 5.2 Matched samples as a robust check

Given the major differences in characteristics generally observed between migrants and urban natives in China, it seems natural to construct comparable groups to control for these differences if we want to answer counterfactual questions, such as: if migrants faced the labor market as urban natives, *ceteris paribus*, what would happen to the wage inequality of the migrants? To achieve this, we apply the Rosenbaum and Rubin (1983) propensity score matching approach to produce a matched sample to ensure that migrants and urban natives are comparable with respect to the observed variables.<sup>15</sup> More specifically, we match the migrant sample to the urban sample within every city through one-to-one matching with replacement, and only keep the observations in the common support.<sup>16</sup> All the variables in table 1 aside from migration experience are used in the matching process.

<Insert Figure 6>

Figure 6 and figure 7 shows the AKK and AKK-SW decomposition results from this matched sample, respectively. In figure 6, the pattern and the magnitude of each component are generally similar to those seen in figure 3 and figure 4. The between-group effect still dominates the other two effects for both migrants and urban natives, i.e. the coefficient effect is the most important contributor to the migrant-urban native wage gap. Figure 7 presents the SW-AKK decomposition result in which the pattern and the magnitude of each component are very similar to those seen in figure 5.

## 5.3 Double “glass ceiling” effects and the interpretations

So far we witness that the gap between urban natives and migrants on the mean of wage distribution is narrowing, which can be seen as an indicator improving integration of Chinese urban labor market. When we analyze the gap on whole distribution, however, it can be found that migrants at high end of wage distribution worse off relatively than their urban counterpart and those at middle or low end during 2002-2007.

We describe the worse-off situation of migrants by double “glass ceiling” effects.

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<sup>15</sup> Zhang, Meng and Wang (2010) also apply propensity score matching method to control for observable differences when they study assimilation of Chinese rural to urban migrants.

<sup>16</sup> The common support of the matching is shown in Appendix figure 1.

Specifically, the “glass ceiling” effects here refer to: 1) high wage migrants experienced a larger wage gap than middle- and low-wage migrants compared to urban natives. 2) high wage migrants experienced a slower wage growth than middle- and low-wage migrants.

More evidence of the “glass ceiling” effect appears in Qu and Zhao (2014). Using the same data as in this paper, they find that the Duncan Segmentation Index between migrants and urban natives in the Chinese urban labor market decreased among the least educated (middle school and below), but not among the most highly educated (high school and above) between 2002 and 2007.<sup>17</sup>

Our decomposition excises also reveal that between group effect dominates other, which indicates that migrants suffers more discrimination. Migrants at high end of wage distribution are treated also worse than ones at middle or low end of wage distribution.

There are a couple of factors which are helpful explaining why double “glass ceiling” effects occur in Chinese urban labor market during 2002 to 2007 .

### **5.3.1 Demand for unskilled and skilled labors**

The following two phenomena present simultaneously during 2002-2007: 1) wages of both migrants and urban natives in lower tails of their wage distribution increase substantially than their counterparts in higher tails (Figure 2), and 2) the wage gap between urban natives and migrants in lower tails shrink much more than that in higher tails (Figure 1). It suggests that they are far from competing with each other in the labor market or the competition between high wage and low groups would not decrease their wages.

The two phenomena can be explained by several exogenous shocks on the demand side during 2002-2007. On the one hand, China joined World Trade Organization (WTO) in 2001, and this has accelerated the process to integrate China into world economy. More and more domestic firms including both state firms and private ones started to export their products. On the other hand, many more multinational companies transferred their low-end production business to China directly or outsourced them to contract suppliers based in China. As a result, China has become the “world factory” which demanded more unskilled labor than skilled ones in the short run. The demand has driven significant increase in wage for both migrants and urban natives during 2002-2007.

Meantime, technology upgrading also spread from developed country to China in some industries like Communications, IT and e-business etc. The skilled technology biased progress in China increased the demand for skilled labor as well. Unfortunately, most migrants are unskilled labor, and even the high wage migrants are not capable to work in these kinds of jobs. So only

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<sup>17</sup> For example, Qu and Zhao (2014) find that the Duncan Index has decreased from 0.44 to 0.34 for the middle school group, but has increased from 0.45 to 0.46 for the college and above group from 2002 to 2007.

urban high-skilled labors enjoy wage premium due to technology progress. But these urban high-skilled labors need some certain services (like cleaning or retailing food etc.), then unskilled migrants have benefited some wage premium from spill-over effect.

### **5.3.2 Minimum wage, employment protection and other social programs**

Meanwhile, during the same period, Chinese government started to build several employment protection and social programs for both rural and urban households, such as minimum wage, public health insurance programs etc. Although, some researchers argue that these policies and programs are far from generous and normally are not fully carried out by local governments (Meng, 2012), many studies show that some of them have substantial effects on health, consumption and other outcome variables of individuals and households (e.g. Bai and Wu, 2014).

Because migrants at the low end of the wage distribution are more likely to be affected by these new policies and programs, this bias toward to low income group may another driving force behind the large increase in wage and shrinking gap between urban natives and migrants on low end wage distribution during 2002-2007.

Table 8 shows the 2002 and 2007 minimum wages in the sampled provinces. Minimum wages increased significantly between 2002 and 2007 in all 7 provinces, with increases ranging from 45% to 124%. The related wage growth was concentrated among low-wage urban natives. Table 8 also presents city-level average monthly wages for urban natives and the percentage of urban natives who earned less than the minimum wage. A considerable share of urban natives earned less than the minimum wage: this share ranged from 4% to 12% in 2002 and from 2% to 10% in 2007. The increase in the minimum wage and the decrease in the incidence of wages under the minimum both help to explain the relatively faster wage growth rate among urban natives at the lower end of the wage distribution. It is also worth noting that, prior to 2008, migrants were hardly covered by minimum wage protection.<sup>18</sup>

<Insert Table 8>

### **5.3.3 Unobservable skills and institutional factors**

Moreover, our results also highlight the importance of residual inequality for migrants at high end of wage distribution, which dominate the upper tail of wage distribution. The residual inequality here represents the returns to unobservable skills or institutional factors for migrants working in urban China.

One explanation to this differential of returns to unobservable skills could be the difference

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<sup>18</sup> China enacted its labor contract law in 2008, and the law requires employers to provide the same labor protections for urban natives and migrants; labor protection and minimum wages continue to be less strictly enforced for migrants.



of the quality of education or other human capital stock between urban natives and migrants. Apparently, there is a huge difference between rural and urban in the quality of schooling in China. The measure of human capital in our data is not good enough to capture the quality of schooling and working experience.

Other unobservable skills of migrants working in the cities may include certain factors which are also important for obtaining high income such as social networks, which are testified in Zhang and Zhao (2015) etc., while urban natives obviously have advantages on the quantities and qualities on these unobserved factors.

Last but not least, China has experienced a rather long period of institutional segmentation between rural and urban labor markets as a result of the *hukou* system. While the importance of *hukou* system is getting smaller, it still affects migrants in many ways and hampers their assimilation in urban China. Even if migrants had the same level of education, working experience, and other observable employment characteristics as their urban counterparts, migrants are unlikely to obtain overall remuneration that is comparable to urban natives, which inevitably make them have access highest income group less in urban areas during 2002-2007.

## **5.4 Implications**

### **5.4.1 Incomplete substitutability and Lewis turning point**

Our results provide an indirect evidence for the incomplete substitutability of migrants with urban natives. The incomplete substitutability of migrants to urban natives sheds light on the discussion whether China has reached Lewis turning point during 2002-2007.

Although urban labor markets in China are highly competitive in lower skilled positions, significant institutional barriers against migrants still exist in positions which require more advanced skills, or which have higher pay (as may occur in state monopolized sectors and industries). And our results reveal that “glass ceiling” effects prevents migrants climbing along the social ladders in urban society, and in turn compressing the upgrading capacity for the middle or low skilled migrants. It confirms that Chinese labor market is still far from integrated (Fleshier et al, 2012). Our results reveal that the labor market barriers especially those unobservable or institutions may not automatically be eliminated as one expected like Cai et al (2011).

If the demand for unskilled labor experiences a negative shock, such as the global financial crisis in 2008 as documented in Kong et al (2010), or the demand shrinks gradually across time for a slowdown of the economy, like the situation occurring right now in China, there can be a possibility that low skilled migrants have to left cities and return to their villages. The development

process in China, where suffer a serious and multiple institutional distortions, may not follow along a straight linear forward as neoclassical economic model describes.

#### **5.4.2 Effects on inequality in China**

To answer the question how the change of inequality among migrant affects the aggregate inequality in urban China, we decompose the aggregate inequality by subgroups into three inequalities: the one within migrants, the one within urban natives and the one between these two groups.

Table 9 calculates the General Entropy (GE) Indexes using different parameters for total population, migrants and urban natives, respectively. First, the statistics shows that using different indicators to measure inequality obtain different results. For example, in 2002, the aggregate inequality of the population (migrants plus urban natives) is from 0.19 to 0.25 in monthly wage based on different GE indices. When using hourly wage, the inequality increase dramatically: the values of GE indices are from 0.29 to 0.34.

<Insert Table 9>

The aggregate wage inequality in urban China has decreased during 2002 to 2007. Specifically, GE indices decreased by 0.02-0.03 using monthly wage and by 0.03-0.05 using hourly wage. The inequality among urban natives slightly increased and the one among migrants decreased dramatically during 2002-2007, the same pattern as we have witnessed in Section III.

The decomposition suggests that the contribution from inequality between these two groups to aggregate one (Column 2 and 7 in Table 9) also decreased slightly (about one or two percent), especially using hourly wage. Taking into the fact that inequality among migrants drop significantly during the period, inequality among urban natives contributes much more to the aggregate inequality.

Our decomposition excise shows that omitting migrants will evitable underestimate the wage inequality in urban China. The amount partially depends on different measures. Specifically, there is only a smaller difference between excluding migrants or include them using monthly wage, while there is a relatively bigger effect using hourly wage to calculate inequality. Because the gap between migrants and urban natives shrank and the inequality among migrants also decreased, the difference was getting smaller during 2002-2007.

## VI. Concluding Remarks

The paper studies the levels and changes in wage inequalities between migrants and urban natives and among migrants themselves during 2002-2007. We find that inequalities for both groups decreased between 2002 and 2007. Our analysis shows that the high-wage migrants experienced slower wage growth than middle-and low-wage migrants, and than their counter partners of urban natives, which are primary causes of declining inequality among migrants. By using distributional decomposition methods, we find that the overall between-group effect dominates in the whole wage distribution of the migrants, which means that the change in returns to the characteristics play a key role, but on the upper tails of the wage distribution, the within group effect dominates, implying that the unobservable factors or institutional barriers do not favor the migrants at the top tail of the wage distribution. By analyzing the change of the wage differentials between migrants and urban natives from 2002 to 2007, we also find that the trend above had reinforced across 5-year period.

We identify two aspects of “glass ceiling” effects behind the different patterns of wage growth among migrants and among urban natives. The "glass ceiling" compresses the migrant wage distribution, reflecting the fact that although Chinese urban labor is highly competitive at the lower end of the wage spectrum, significant institutional barriers continue to limit migrants to enter high skilled and highly paid positions.

This situation highlights the importance of understanding the roots of inequality before formulating policy recommendations. Although the Chinese public and the government both tend to view increases in inequality negatively, our findings suggest that the particular case of decreasing wage inequality among migrants between 2002 and 2007 is no cause for celebration, since it largely results from the presence of "glass ceiling" effects.

The Chinese government continues to promote the curbing of ever-increasing inequality as one of its major goals in the pursuit of and building of a “harmonious society”. However, the situation may not improve, and may even possibly worsen, if it delays achieving a fundamental reform of the *hukou* system and its internal migration policy.

Without such reform, the existing institutional barrier will continue to prevent the free mobility of labor within China, and will continue to be a main source of discriminatory practice in the urban Chinese labor market. A unified labor market can not only improve the efficiency of labor right away, it can also change long-term incentives regarding human capital accumulation, thus benefiting society in the long run.

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**Table 1. Descriptive Statistics in 2002 and 2007**

Variables	Urban Natives				Migrants			
	2002		2007		2002		2007	
	Mean	Std. Dev.	Mean	Std.Dev.	Mean	Std. Dev.	Mean	Std.Dev.
Monthly earnings (Chinese yuan)	1,148.46	772.61	1,844.82	1,252.96	812.27	576.62	1,352.31	756.92
Hourly earnings (Chinese yuan)	6.55	4.52	10.14	7.23	2.90	2.38	5.28	3.08
Working hours per week	43.15	11.52	44.57	10.39	71.96	19.53	64.43	19.60
Male (dummy)	0.56	0.50	0.54	0.50	0.55	0.50	0.57	0.50
Age (year)	40.70	8.95	38.76	9.39	34.67	7.49	32.17	9.22
Education (year)	11.62	2.77	12.26	3.57	7.92	2.68	9.01	2.56
Experience (year)	23.08	9.96	20.54	10.83	20.74	8.65	17.16	10.30
Migration experience (year)					7.13	5.03	7.68	6.18
Married (dummy)	0.89	0.31	0.88	0.32	0.94	0.23	0.74	0.44
Minority (dummy)	0.01	0.11	0.01	0.11	0.04	0.20	0.01	0.10
Education level								
Less than primary school (dummy)	0.00	0.05	0.01	0.08	0.10	0.30	0.05	0.22
Primary school (dummy)	0.01	0.12	0.02	0.16	0.22	0.41	0.14	0.35
Middle school (dummy)	0.21	0.40	0.19	0.39	0.51	0.50	0.56	0.50
High school (dummy)	0.46	0.50	0.36	0.48	0.16	0.37	0.20	0.40
College and above (dummy)	0.32	0.47	0.42	0.49	0.02	0.13	0.04	0.20
Self-rated Health status								
Good	0.65	0.48	0.78	0.41	0.92	0.28	0.86	0.35
Normal	0.31	0.46	0.20	0.40	0.08	0.26	0.13	0.34
Bad	0.04	0.19	0.01	0.12	0.01	0.09	0.02	0.12

**Table 1. Descriptive Statistics in 2002 and 2007(Continued)**

Variable	Urban Natives				Migrants			
	2002		2007		2002		2007	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Industry								
Mineral, Manufactory and Construction	0.33	0.47	0.24	0.43	0.14	0.35	0.23	0.42
Electricity, Gas, Transportation and IT	0.11	0.31	0.16	0.37	0.03	0.18	0.04	0.20
Sale, Food and Hotel	0.13	0.34	0.15	0.35	0.47	0.50	0.52	0.50
Finance, Estate, Health and Education	0.18	0.39	0.21	0.41	0.05	0.22	0.05	0.22
General Service	0.14	0.35	0.16	0.36	0.25	0.43	0.17	0.37
Government and Public Administration	0.11	0.31	0.08	0.28	0.06	0.23	0.00	0.04
Ownership								
State Owned or State Controlled	0.64	0.48	0.52	0.50	0.08	0.27	0.04	0.20
Collective	0.06	0.24	0.02	0.15	0.04	0.20	0.01	0.10
Private	0.05	0.21	0.11	0.32	0.08	0.27	0.30	0.46
Individual	0.05	0.22	0.12	0.32	0.72	0.45	0.46	0.50
Foreign or Joint Venture	0.03	0.18	0.05	0.22	0.01	0.08	0.09	0.29
Other Shared holders	0.07	0.26	0.10	0.30	0.02	0.15	0.06	0.23
Others	0.10	0.30	0.08	0.27	0.05	0.22	0.03	0.18
Number of observations	1811		2263		1253		2064	

**Data source:** China Household Income Project, 2002 and 2007.

**Notes:** Wages are all expressed in 2002 price with provincial CPI adjustment. Experience is potential experience and is calculated as: respondent's age minus his/her schooling years and 7. Migration experience is calculated as: the year of conducting survey minus the year of the first migration reported by migrants.



**Table 2. Wage Differentials between Urban Natives and Migrants in 2002 and 2007**

	2002				2007			
	Urban Natives	Migrants	Differentials	Ratio	Urban Natives	Migrants	Differentials	Ratio
<b>Monthly Wage (Yuan)</b>								
Mean	1168.39	868.68	299.71	1.35	1887.99	1409.96	478.03	1.34
90th percentile	2083.33	1500	583.33	1.39	3491.22	2243.32	1247.9	1.56
median	973.75	680	293.75	1.43	1509	1194.64	314.36	1.26
10th percentile	411.67	400	11.67	1.03	680.98	685.64	-4.66	0.99
<b>Hourly Wage (Yuan)</b>								
Mean	6.74	3.21	3.53	2.1	10.68	5.46	5.22	1.96
90th percentile	12.36	5.18	7.18	2.39	20.02	9.41	10.61	2.13
Median	5.47	2.22	3.25	2.46	7.84	4.39	3.45	1.79
10th percentile	2.18	1.11	1.07	1.96	3.45	2.28	1.16	1.51

**Data source:** China Household Income Project, 2002 and 2007.

**Note:** Wages are all expressed in 2002 price with provincial CPI adjustment.

**Table 3. Differentials in Social Benefits between Urban Natives and Migrants in 2002 and 2007**

	2002			2007			Diff-in-Diff
	Urban Natives	Migrants	Differentials	Urban Natives	Migrants	Differentials	
Social Benefits (%)							
Unemployment insurance	0.41 (0.49)	0.01 (0.12)	0.399*** [28.13]	0.56 (0.5)	0.12 (0.33)	0.438*** [33.08]	0.039** [2.17]
Pension	0.62 (0.49)	0.05 (0.23)	0.565*** [38.33]	0.75 (0.44)	0.17 (0.38)	0.582*** [45.46]	0.18 [0.96]
Health insurance	0.66 (0.47)	0.02 (0.13)	0.640*** [46.45]	0.82 (0.38)	0.63 (0.48)	0.193*** [14.07]	-0.448*** [-24.76]
Number of observations	1806	1249		2058	2009		7122

**Notes:** Standard deviations of participation rate are shown within parentheses.

Robust t statistics of differences between two groups and of difference-in-differences are shown within brackets.

\*, \*\*, \*\*\* denotes 10%, 5% and 1% levels of significance respectively.

The numbers of observation here are slightly smaller than the ones in Table 1 because 172 observations are with "no response" answers or missing values.

**Table 4. Overall Inequalities among Migrants and among Urban Natives in 2002 and 2007**

	Urban Natives				Migrants			
	2002	2007	Change	Growth (%)	2002	2007	Change	Growth (%)
<b>Monthly Wage</b>								
Mean (Yuan)	1168.39	1887.99	719.60	60.63	868.68	1409.96	541.28	66.49
Gini coefficient	0.34	0.35	0.01	2.94	0.31	0.27	-0.04	-12.9
Theil index	0.19	0.2	0.01	5.26	0.18	0.13	-0.05	-27.78
Ratio of 90th to 10th percentile	5.38	5.45	0.07	1.38	3.75	3.28	-0.47	-12.8
Ratio of 90th to median	2.21	2.39	0.18	7.94	2.31	1.92	-0.39	-14.93
Ratio of median to 10th percentile	2.43	2.28	-0.15	-6.33	1.63	1.7	0.07	2.35
<b>Hourly Wage</b>								
Mean (Yuan)	6.74	10.68	3.94	54.81	3.21	5.46	2.25	82.07
Gini coefficient	0.36	0.37	0.01	2.78	0.36	0.3	-0.06	-16.67
Theil index	0.21	0.22	0.01	4.55	0.24	0.15	-0.09	-37.5
Ratio of 90th to 10th percentile	6.13	6.26	0.13	2.47	4.8	4.4	-0.4	-11.78
Ratio of 90th to median	2.32	2.6	0.28	12.83	2.4	2.18	-0.22	-8.15
Ratio of median to 10th percentile	2.65	2.41	-0.24	-9.16	2	2.02	0.02	4

**Data source:** China Household Income Project, 2002 and 2007.

**Note:** Wages are all expressed in 2002 prices with provincial CPI adjustment.

**Table 5. Wage across Experience and Education Groups, 2002-2007**

Panel A: Experience Group						
Experience	Urban Natives			Migrants		
	2002	2007	Growth (%)	2002	2007	Growth (%)
<u>Monthly Earnings</u>						
0-10 years	993.67	1940.18	95.25%	766.43	1235.08	61.15%
11-20 years	1165.28	2039.97	75.06%	878.01	1466.91	67.07%
21-30 years	1127.61	1790.92	58.82%	786.55	1369.14	74.07%
30-40 years	1246.57	1573.2	26.20%	714.53	1341.12	87.69%
Total	1148.46	1844.82		812.27	1352.31	
<u>Hourly Earnings</u>						
0-10 years	5.73	10.67	86.21%	3.2	5.18	61.87%
11-20 years	6.6	10.97	66.21%	3.14	5.71	81.85%
21-30 years	6.52	10.06	54.29%	2.66	5.02	88.72%
30-40 years	6.99	8.64	23.61%	2.59	5.16	99.23%
Total	6.55	10.14	54.81%	2.9	5.28	82.07%
Panel B: Education Group						
Education Level	Urban Natives			Migrants		
	2002	2007	Growth (%)	2002	2007	Growth (%)
<u>Monthly Earnings</u>						
Less than primary school	785.57	1433.06	82.42%	634.82	1263.96	99.11%
Primary school	940.6	1648.97	75.31%	808.39	1335.48	65.20%
Middle school	997.24	1568.05	57.24%	860.27	1340.95	55.88%
High school	1225.44	1900.4	55.08%	976.8	1449.18	48.36%
College and above	1612.04	2346.8	45.58%	1000	1511.47	51.15%
Total	1148.46	1844.82	60.63%	812.27	1352.31	66.49%
<u>Hourly Earnings</u>						
Less than primary school	4.11	7.47	81.75%	2.18	4.19	92.20%
Primary school	5.15	9.27	80.00%	2.76	4.49	62.68%
Middle school	5.59	8.43	50.81%	3.12	5.57	78.53%
High school	7.1	10.47	47.46%	3.93	5.86	49.11%
College and above	9.24	13.08	41.56%	4.86	7.35	51.23%
Total	6.55	10.14	54.81%	2.9	5.28	82.07%

**Data source:** China Household Income Project, 2002 and 2007.

**Notes:** Wages are all expressed in 2002 price with provincial CPI adjustment. Potential experience is defined as in Table 1. High school includes senior, technical and professional high school.

**Table 6. Wage Equations for Urban Natives and Migrants, 2002-2007**

	Urban Natives						Migrants					
	2002			2007			2002			2007		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Male (dummy)	0.125***	0.120***	0.074***	-0.011	-0.005	0.003	0.208***	0.210***	0.158***	0.205***	0.206***	0.188***
	[0.03]	[0.03]	[0.03]	[0.03]	[0.03]	[0.02]	[0.03]	[0.03]	[0.03]	[0.02]	[0.02]	[0.02]
Education (year)	0.096***	0.095***	0.060***	0.040***	0.038***	0.021***	0.029***	0.029***	0.023***	0.038***	0.036***	0.033***
	[0.01]	[0.01]	[0.01]	[0.00]	[0.00]	[0.00]	[0.01]	[0.01]	[0.01]	[0.01]	[0.01]	[0.01]
Experience (year)	0.023***	0.016**	0.018***	0.013***	0.006	0.001	0.007	0.006	0.008	0.011***	0.006	0.005
	[0.01]	[0.01]	[0.01]	[0.00]	[0.01]	[0.01]	[0.01]	[0.01]	[0.01]	[0.00]	[0.00]	[0.00]
Experiences Squared	-0.000	0.000	-0.000	-0.000***	-0.000	0.000	-0.000**	-0.000**	-0.000**	0.000***	-0.000	-0.000
	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]
Individual Characteristics												
Minority (dummy)		✓	✓		✓	✓		✓	✓		✓	✓
Married (dummy)		✓	✓		✓	✓		✓	✓		✓	✓
Self-reported health		✓	✓		✓	✓		✓	✓		✓	✓
Work Characteristics												
Industry			✓			✓			✓			✓
Ownership			✓			✓			✓			✓
City fixed Effect	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Constant	0.095	0.118	0.711***	1.488***	1.480***	2.010***	0.745***	0.728***	1.404***	1.404***	1.443***	1.528***
	[0.10]	[0.10]	[0.10]	[0.09]	[0.09]	[0.09]	[0.12]	[0.12]	[0.25]	[0.07]	[0.07]	[0.10]
R-squared	0.30	0.30	0.44	0.19	0.19	0.35	0.19	0.19	0.27	0.22	0.23	0.26
Observations	1811	1811	1811	2263	2263	2263	1253	1253	1253	2064	2064	2064

**Data source:** China Household Income Project, 2002 and 2007.

**Notes:** Wages are all expressed in 2002 price with provincial CPI adjustment.

\*, \*\*, \*\*\* denotes 10%, 5% and 1% levels of significance respectively.

Experience is defined as in Table 1.

Self-reported health status, industry and ownership are as in Table 1

City dummies include seven cities: Wuxi, Hefei, Zhengzhou, Wuhan, Guangzhou, Chongqing and Chengdu.

**Table 7. Residual Inequality for Urban Natives and Migrants in 2002 and 2007**

	Urban Natives			Migrant		
	2002	2007	Growth (%)	2002	2007	Growth (%)
<b>Residual I</b>						
Mean	1.16	1.2	3.45%	1.18	1.13	-4.24%
Ratio of 90th to 10th percentile	4.09	4.8	17.36%	3.89	3.32	-14.65%
Ratio of 90th to median	1.95	2.21	13.33%	2.09	1.86	-11%
Ratio of median to 10th percentile	2.1	2.17	3.33%	1.86	1.78	-4.30%
<b>Residual II</b>						
Mean	1.14	1.16	1.75%	1.16	1.12	-3.45%
Ratio of 90th to 10th percentile	3.48	3.99	14.66%	3.62	3.23	-10.77%
Ratio of 90th to median	1.85	2	8.11%	1.97	1.86	-5.58%
Ratio of median to 10th percentile	1.88	2	6.38%	1.84	1.74	-5.43%

**Data source:** China Household Income Project, 2002 and 2007.

**Table 8. Minimum Wages of the Sampled Provinces: 2002 and 2007**  
(Chinese yuan per month)

Province (City)	Monthly Minimum Wage			Monthly Average Wage <sup>a</sup>		Below Min. Wage (%) <sup>b</sup>	
	2002	2007	Growth (%)	2002	2007	2002	2007
				Urban Natives	Urban Natives	Urban Natives	Urban Natives
Anhui (Hefei)	370	560	51.35%	1279.96	1794.44	8.00%	10.00%
Chongqing (Chongqing)	320	580	81.25%	945.2	1862.81	10.00%	2.00%
Henan (Zhengzhou)	290	650	124.14%	820.68	1528.48	8.00%	6.00%
Hubei (Wuhan)	400	580	45.00%	954.25	1537.42	12.00%	4.00%
Guangdong (Guangzhou)	510	850	66.67%	1897.08	3426.02	4.00%	2.00%
Jiangsu (Wuxi)	460	850	84.78%	1056.48	1624.59	5.00%	3.00%
Sichuan (Chengdu)	340	580	70.59%	1064.24	1620.64	8.00%	7.00%

**Data Sources:** 1. Minimum wages are from different local governmental documents.

2. a & b are calculated by the authors using the China Household Income Project, 2002 and 2007.

**Note:** Wages are all expressed in 2002 price with provincial CPI adjustment.



**Table 9. Inequality Decomposition between Subgroups in 2002 and 2007**

	2002					2007				
	Total	Between	Within			Total	Between	Within		
			Total	Urban Natives	Migrants			Total	Urban Natives	Migrants
Monthly Wage										
GE(0)	0.19	0.01	0.18	0.2	0.15	0.17	0.01	0.16	0.2	0.12
Share		7%	93%	60%	32%		7%	93%	61%	32%
GE(1)	0.2	0.01	0.19	0.19	0.18	0.18	0.01	0.17	0.2	0.13
Share		7%	93%	64%	29%		6%	94%	66%	28%
GE(2)	0.25	0.01	0.24	0.23	0.25	0.22	0.01	0.21	0.23	0.16
Share		5%	95%	68%	26%		5%	95%	71%	24%
Hourly Wage										
GE(0)	0.29	0.07	0.21	0.22	0.21	0.24	0.05	0.19	0.22	0.15
Share		26%	74%	45%	30%		22%	78%	49%	30%
GE(1)	0.28	0.07	0.21	0.21	0.24	0.25	0.05	0.2	0.22	0.15
Share		24%	76%	56%	20%		20%	80%	60%	20%
GE(2)	0.34	0.06	0.28	0.24	0.34	0.31	0.05	0.26	0.25	0.17
Share		18%	82%	69%	13%		16%	84%	72%	12%
Observations	3064			1811	1253	4327			2263	2064

**Data source:** China Household Income Project, 2002 and 2007.

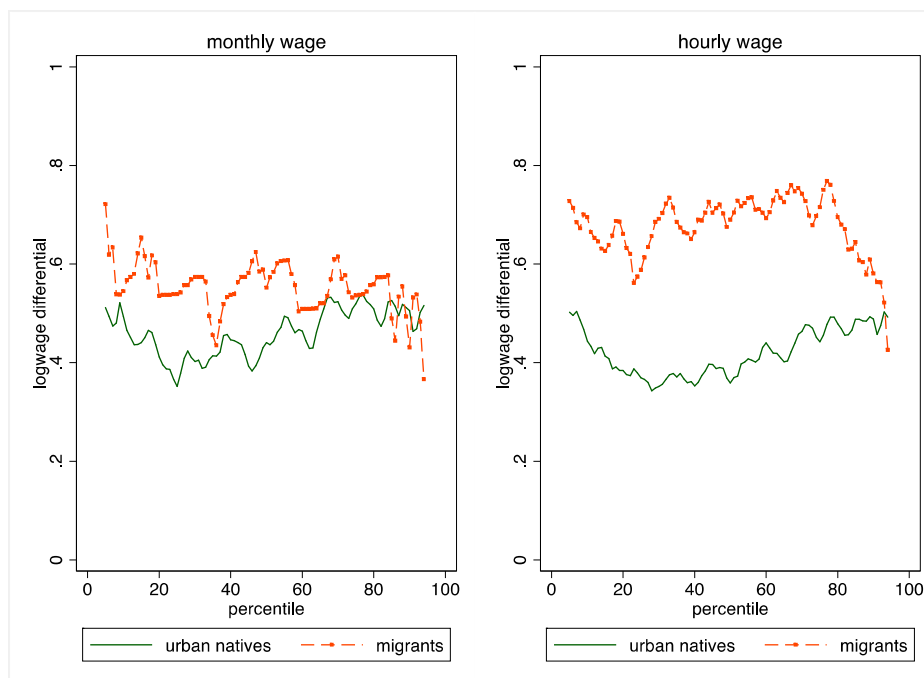
**Notes:** Wages are all expressed in 2002 prices with provincial CPI adjustment. GEs are general Entropy index at different parameter level.

**Figure 1. Logarithm of Wage Differentials between Migrants and Urban Natives by Percentile, 2002-2007**



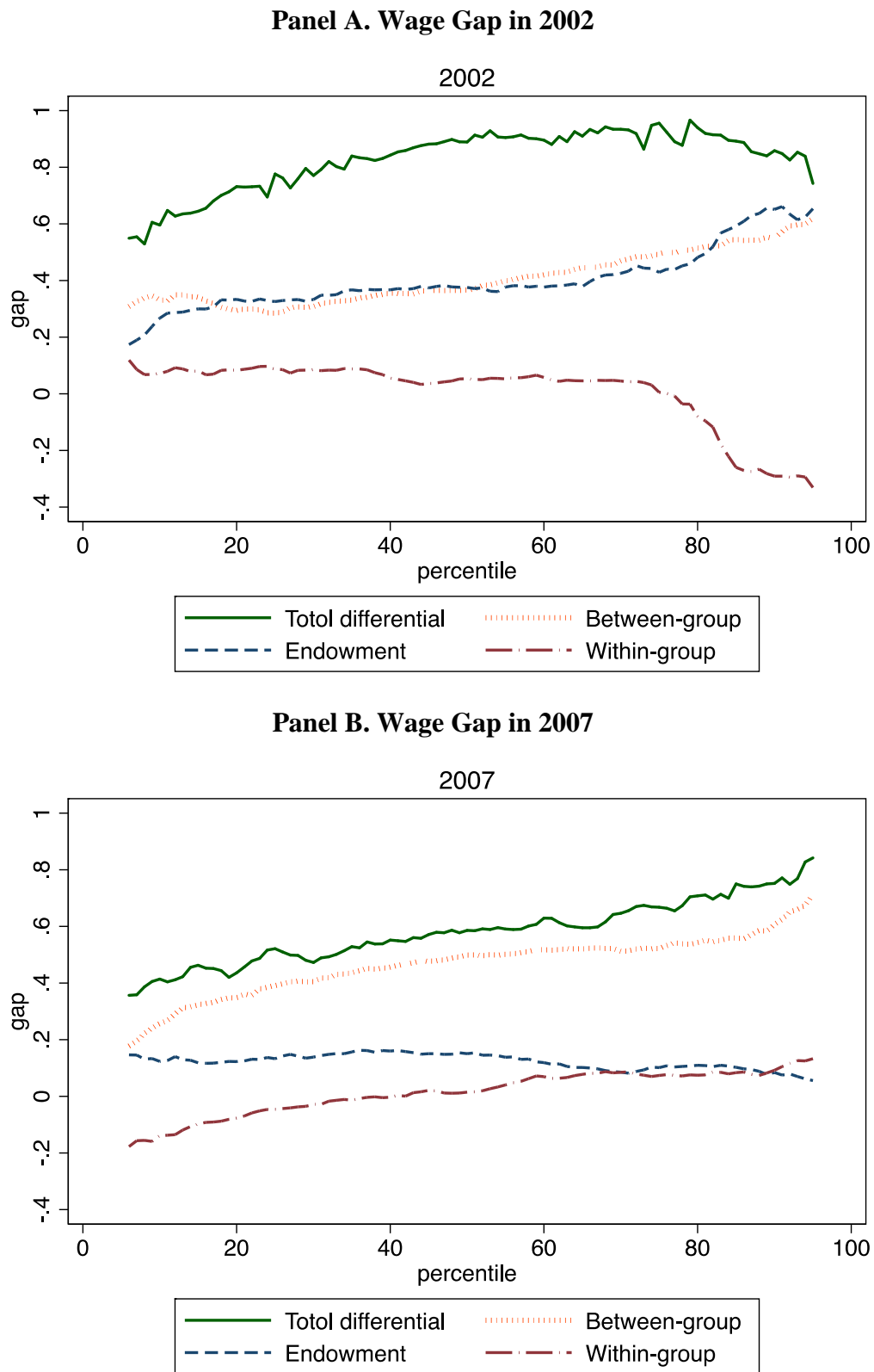
Data source: China Household Income Project, 2002 and 2007.

**Figure 2. Changes in Logarithm of Wages for Migrants and Urban Natives by Percentile, 2002-2007**



Data source: China Household Income Project, 2002 and 2007.

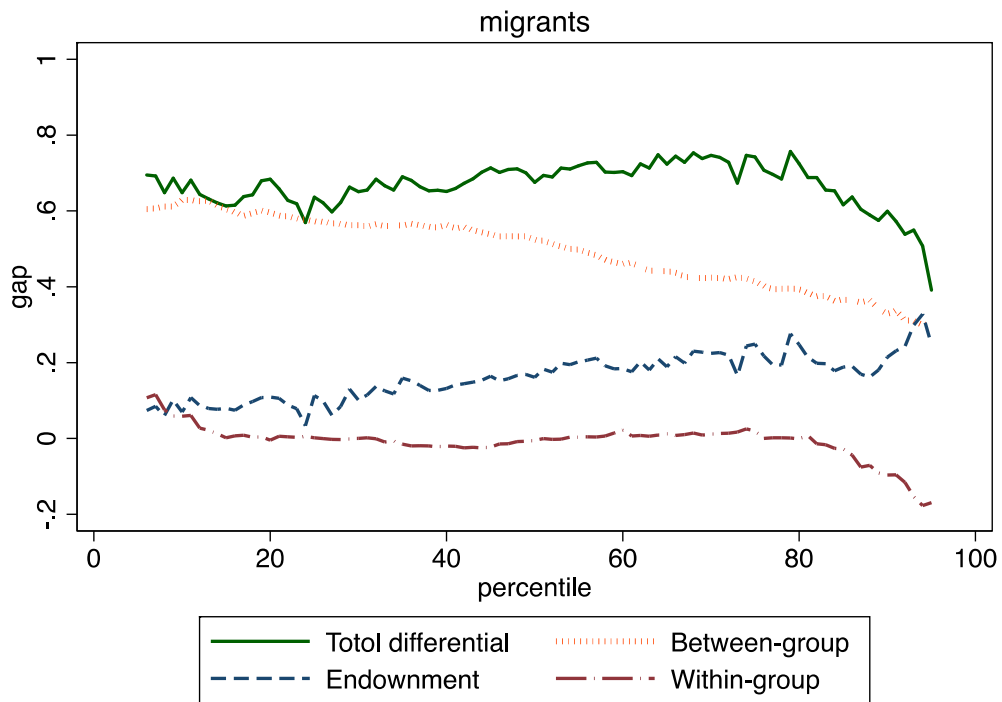
**Figure 3. AKK Decompositions Wage Gap between Migrants and Urban Natives:  
2002 and 2007**



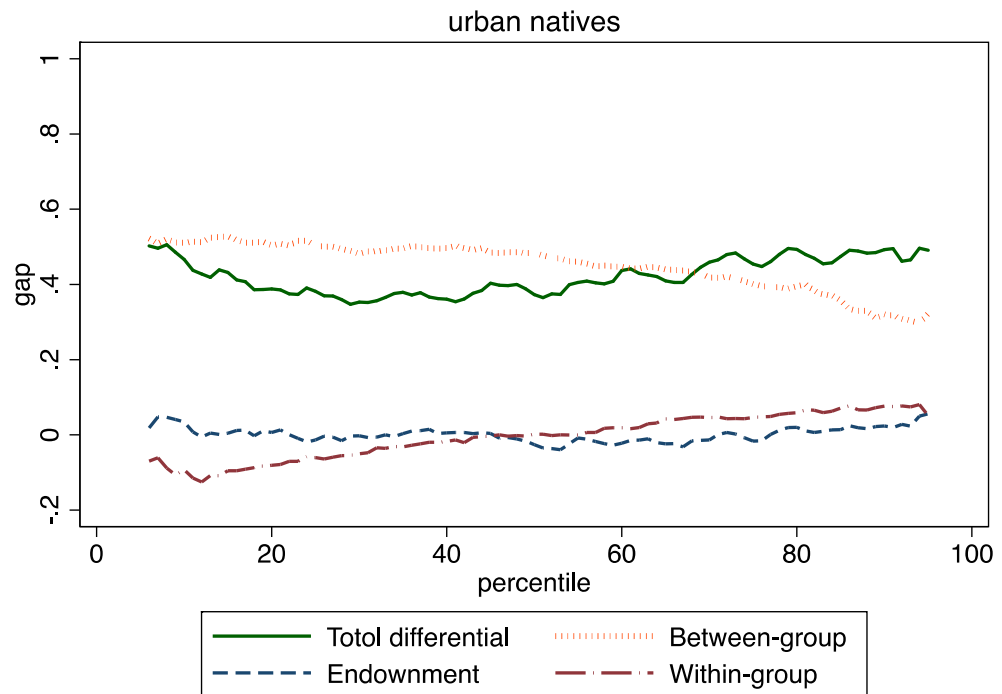
**Data source:** China Household Income Project, 2002 and 2007.

**Figure 4. AKK Decomposition on Wage from 2002 to 2007**

**Panel A. Migrants**

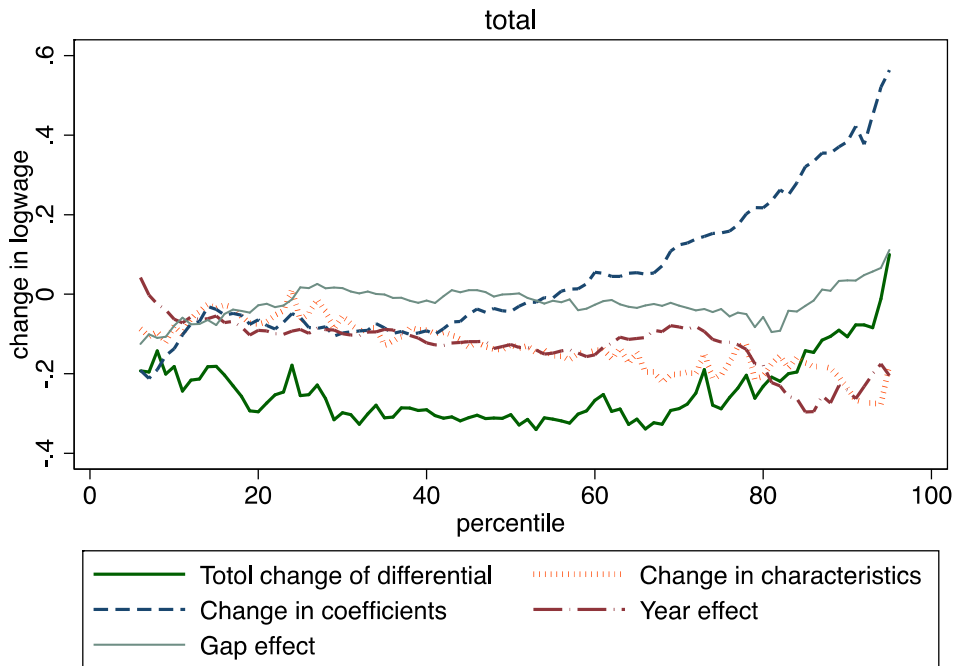


**Panel B. Urban Natives**

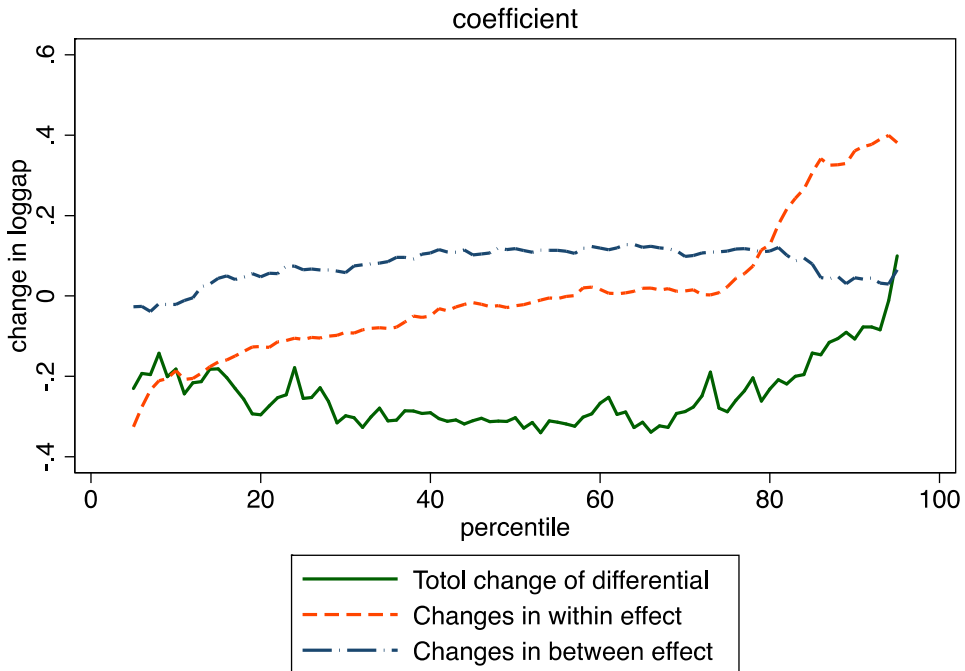


**Data source:** China Household Income Project, 2002 and 2007.

**Figure 5. SW Decomposition on Wage Gap**  
**Panel A. Total Decomposition**

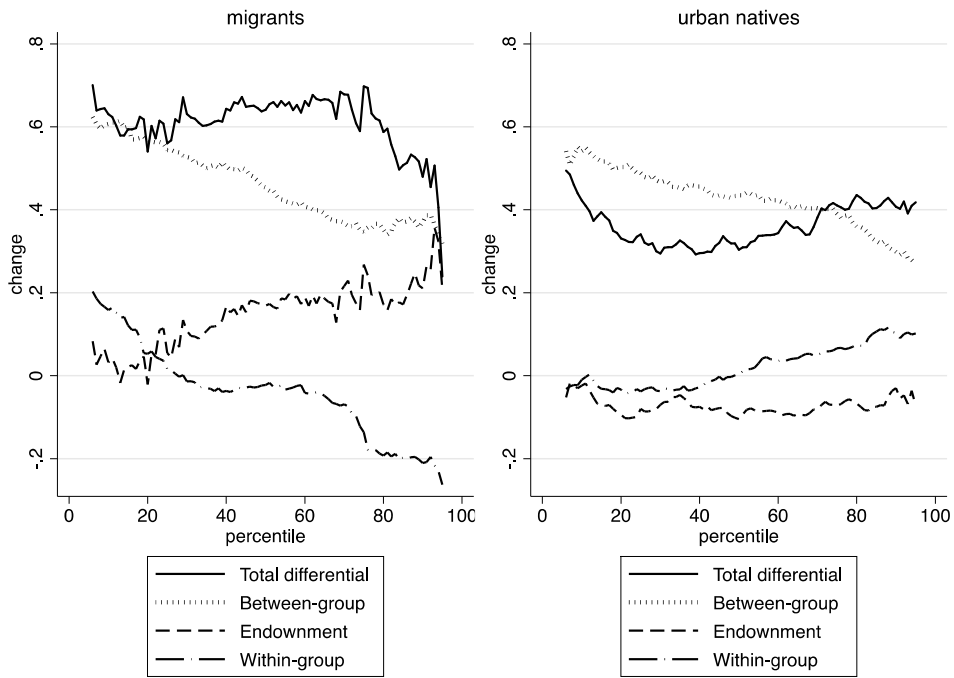


**Panel B. Coefficient Decomposition**

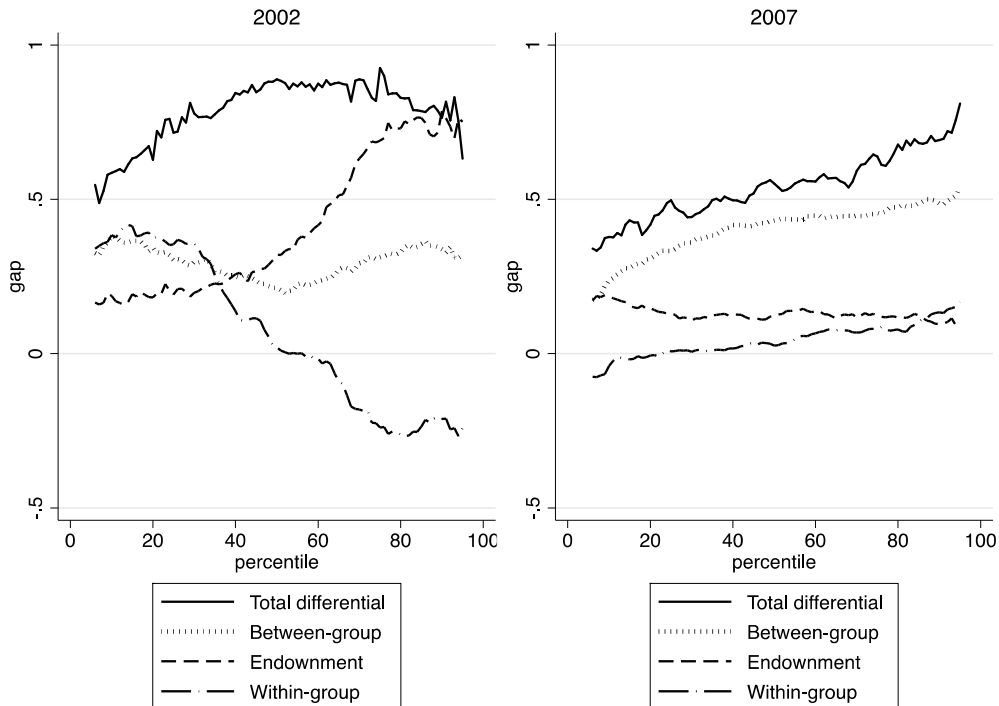


**Data source:** China Household Income Project, 2002 and 2007.

**Figure 6. AKK Decompositions Wage Gap for Comparable Samples  
Panel A. Change from 2002 to 2007: Migrants and Urban Natives**

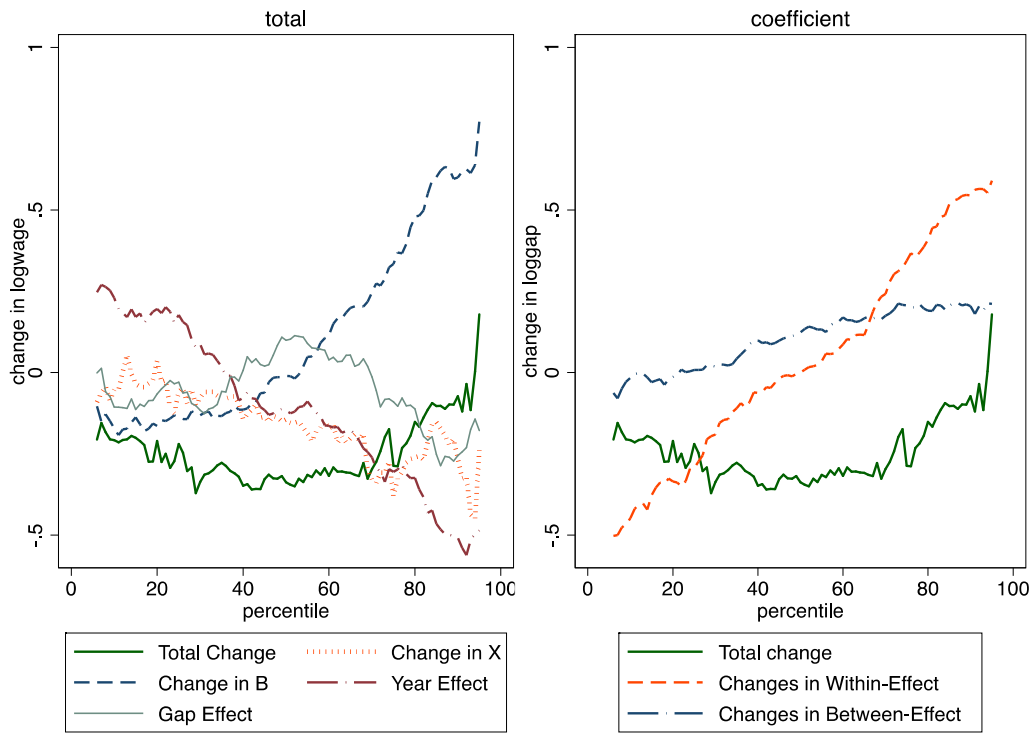


**Panel B. Between Migrants and Urban Natives: 2002 and 2007**



**Data source:** China Household Income Project, 2002 and 2007.

**Figure 7. SW Decomposition on Wage Gap for Comparable Samples**



**Data source:** China Household Income Project, 2002 and 2007.

**Appendix Table 1. Comparison of Kept and Dropped Observations**

Appendix Table 1. Comparison of Kept and Dropped Observations		Keep		Drop	
		Mean	Std. Dev.	Mean	Std.Dev.
Variable					
Monthly earnings		1,418.67	1,223.78	1,112.32	542.76
Hourly earnings		5.51	4.55	4.63	2.72
Working hours per week		64.70	19.63	60.13	14.43
Male		0.57	0.50	0.65	0.48
Age		32.21	9.24	29.62	10.52
Education (year)		9.00	2.62	9.10	2.44
Experience (potential experience)		17.21	10.34	14.53	11.55
Migration experience		7.70	6.20	6.32	6.38
Married		0.74	0.44	0.49	0.50
Minority		0.01	0.09	0.02	0.13
Health status					
	Good	0.85	0.36	0.86	0.35
	Normal	0.13	0.34	0.13	0.33
	Bad	0.02	0.12	0.01	0.11
Industry					
	Mineral, Manufactory and Construction	0.22	0.42	0.39	0.49
	Electricity, Gas, Transportation and IT	0.04	0.19	0.03	0.17
	Sales and Hotel	0.52	0.50	0.34	0.48
	Finance, Estate, Health and Education Service	0.05	0.22	0.06	0.25
	Government and Public Administration	0.17	0.37	0.17	0.38
		0.00	0.04	0.00	0.00
Ownership					
	State Owned and State Controlled	0.04	0.20	0.06	0.24
	Collective	0.01	0.10	0.03	0.16
	Private	0.30	0.46	0.45	0.50
	Individual	0.47	0.50	0.24	0.43
	Foreign and Joint Venture	0.09	0.29	0.08	0.28
	Other Shared	0.06	0.23	0.06	0.23
	Others	0.03	0.18	0.08	0.27
City					
	Wuxi	0.11	0.32	0.03	0.18
	Hefei	0.14	0.35	0.11	0.31
	Zhengzhou	0.16	0.36	0.11	0.32
	Wuhan	0.14	0.35	0.17	0.38
	Guangzhou	0.14	0.35	0.18	0.39
	Chongqing	0.18	0.38	0.17	0.38
	Chengdu	0.13	0.33	0.22	0.41



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Number of observations	2114	1031
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**Data source:** China Household Income Project, 2002 and 2007.

**Notes:** Wages are all expressed in 2002 price with provincial CPI adjustment. Experience is defined as in Table 1.

**Appendix Table 2A. Detailed Wage Equations for Urban natives, 2002-2007**

Urban natives		2002			2007		
		(1)	(2)	(3)	(4)	(5)	(6)
Male (dummy)		0.125*** [0.03]	0.120*** [0.03]	0.074*** [0.03]	-0.011 [0.03]	-0.005 [0.03]	0.003 [0.02]
Education (year)		0.096*** [0.01]	0.095*** [0.01]	0.060*** [0.01]	0.040*** [0.00]	0.038*** [0.00]	0.021*** [0.00]
Experience (year)		0.023*** [0.01]	0.016** [0.01]	0.018*** [0.01]	0.013*** [0.00]	0.006 [0.01]	0.001 [0.01]
Experience squared		-0.000 [0.00]	0.000 [0.00]	-0.000 [0.00]	-0.000*** [0.00]	-0.000 [0.00]	-0.000 [0.00]
Minority (dummy)			-0.086 [0.12]	-0.089 [0.11]		-0.078 [0.13]	-0.069 [0.10]
Married (dummy)			0.110 [0.07]	0.056 [0.06]		0.126** [0.05]	0.110** [0.05]
Health	Base: Bad						
	Good		-0.064** [0.03]	-0.034 [0.03]		-0.002 [0.03]	0.039 [0.03]
	Fair		-0.189*** [0.07]	-0.131* [0.07]		-0.116 [0.11]	0.026 [0.10]
Ownership	Base: State Owned or State Controlled						
	Collective			-0.165*** [0.05]			-0.057 [0.08]
	Private			0.031 [0.07]			-0.026 [0.04]

	Individual			-0.196***		-0.103**
				[0.07]		[0.05]
	Foreign and Joint Venture			0.128*		0.033
				[0.07]		[0.05]
	Other Shared			-0.049		0.046
				[0.05]		[0.04]
	Others			-0.033		-0.051
				[0.06]		[0.05]
Industry	Base: Mineral, Manufactory and Construction					
	Electricity, Gas, Transportation and IT			0.109**		0.084**
				[0.05]		[0.04]
	Sales and Hotel			-0.072		-0.138***
				[0.05]		[0.04]
	Finance, Estate, Health and Education			0.304***		0.087**
				[0.04]		[0.03]
	Service			-0.115***		-0.185***
				[0.04]		[0.04]
	Public Administration			0.207***		0.189***
				[0.04]		[0.05]
City fixed Effect	✓	✓	✓	✓	✓	✓
Constant	0.095	0.118	0.711***	1.488***	1.480***	2.010***
	[0.10]	[0.10]	[0.10]	[0.09]	[0.09]	[0.09]
R-squared	0.30	0.30	0.44	0.19	0.19	0.35
Observations	1811	1811	1811	2263	2263	2263

**Data source:** China Household Income Project, 2002 and 2007.

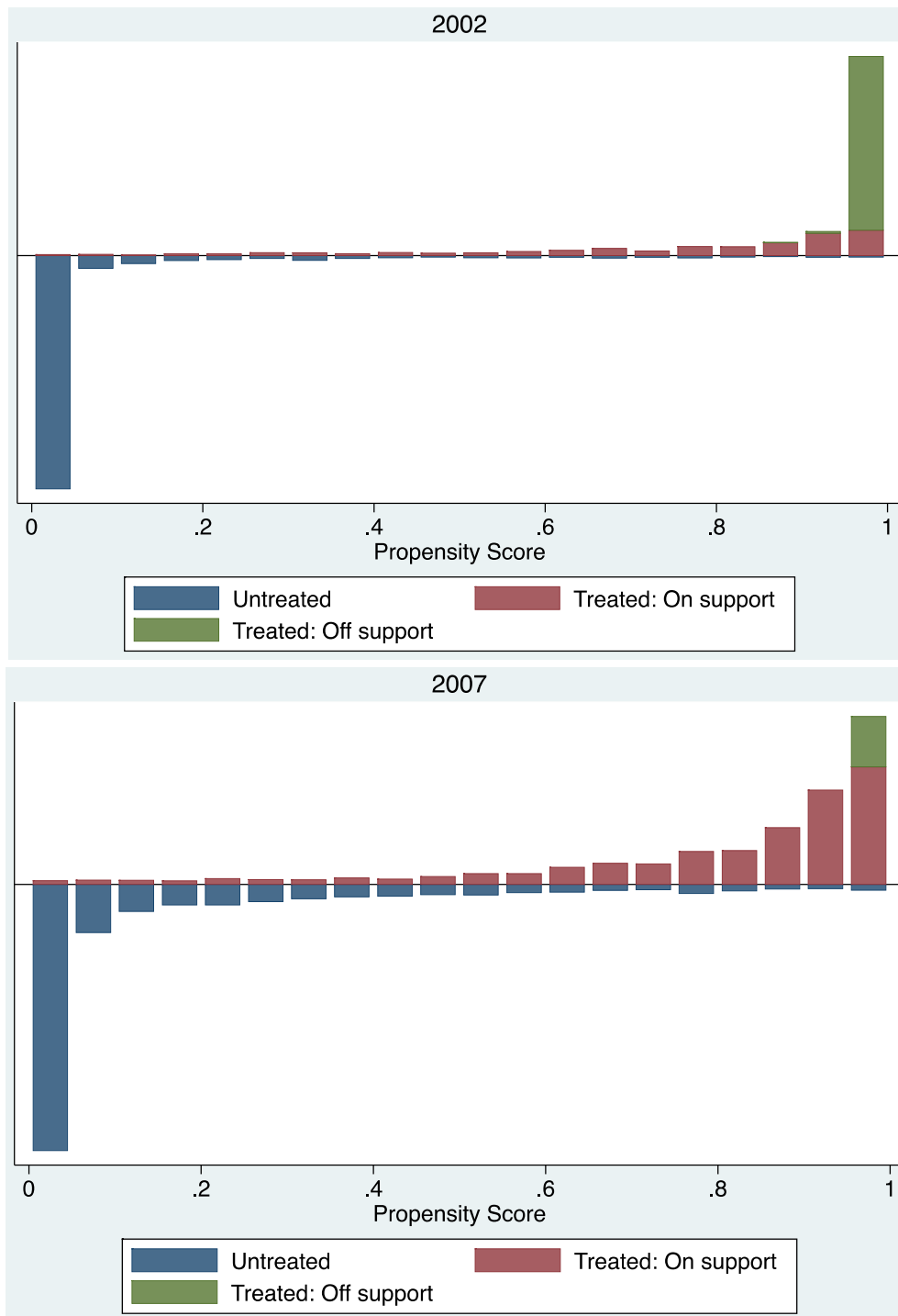
**Appendix Table 2B. Detailed Wage Equations for Migrants, 2002-2007**

Migrants		2002			2007		
		(1)	(2)	(3)	(4)	(5)	(6)
Male (dummy)		0.205*** [0.03]	0.207** [0.03]	0.158*** [0.03]	0.206*** [0.02]	0.207*** [0.02]	0.189*** [0.02]
Education (year)		0.029*** [0.01]	0.029** [0.01]	0.023*** [0.01]	0.038*** [0.01]	0.036*** [0.01]	0.033*** [0.01]
Experience (year)		0.006 [0.01]	0.005 [0.01]	0.008 [0.01]	0.011*** [0.00]	0.007 [0.00]	0.005 [0.00]
Experience squared		-0.000** [0.00]	-0.000* [0.00]	-0.000* [0.00]	-0.000*** [0.00]	-0.000 [0.00]	-0.000 [0.00]
Minority (dummy)			0.031 [0.08]	-0.002 [0.08]		-0.022 [0.08]	-0.027 [0.09]
Married (dummy)			0.038 [0.09]	-0.058 [0.09]		0.048 [0.03]	0.024 [0.03]
Health	Base: Bad						
	Good		0.151** [0.06]	0.116** [0.06]		-0.065** [0.03]	-0.043 [0.03]
	Fair		0.031 [0.20]	0.018 [0.19]		-0.185* [0.11]	-0.155 [0.11]
Ownership	Base: State Owned and State Controlled						
	Collective			0.015 [0.08]			-0.013 [0.09]
	Private			0.329*** [0.08]			-0.035 [0.05]

	Individual							-0.122		-0.082*
								[0.07]		[0.05]
	Foreign and Joint Venture							0.299***		0.070
								[0.11]		[0.05]
	Other Shared							0.255**		0.065
								[0.12]		[0.06]
	Others							-0.064		-0.043
								[0.08]		[0.07]
Industry	Based: Mineral, Manufactory and Construction									
	Electricity, Gas, Transportation and IT							0.141		-0.126**
								[0.12]		[0.05]
	Sales and Hotel							-0.229***		-0.124***
								[0.06]		[0.03]
	Finance, Estate, Health and Education							-0.167**		-0.153***
								[0.08]		[0.06]
	Service							-0.206***		-0.099***
								[0.06]		[0.04]
	Government and Public Administration							-0.077		-0.213
								[0.09]		[0.13]
City fixed Effect		✓	✓	✓	✓	✓	✓			✓
Constant		0.745***	0.728**	1.404***	1.404***	1.443***	1.528***			
		[0.12]	[0.12]	[0.25]	[0.07]	[0.07]	[0.10]			
R-squared		0.19	0.19	0.27	0.22	0.23	0.26			
Observatio		1253	1253	1253	2064	2064	2064			

**Data source:** China Household Income Project, 2002 and 2007.

**Appendix Figure 1. Common Support of Propensity Matching**



**Data source:** China Household Income Project, 2002 and 2007.

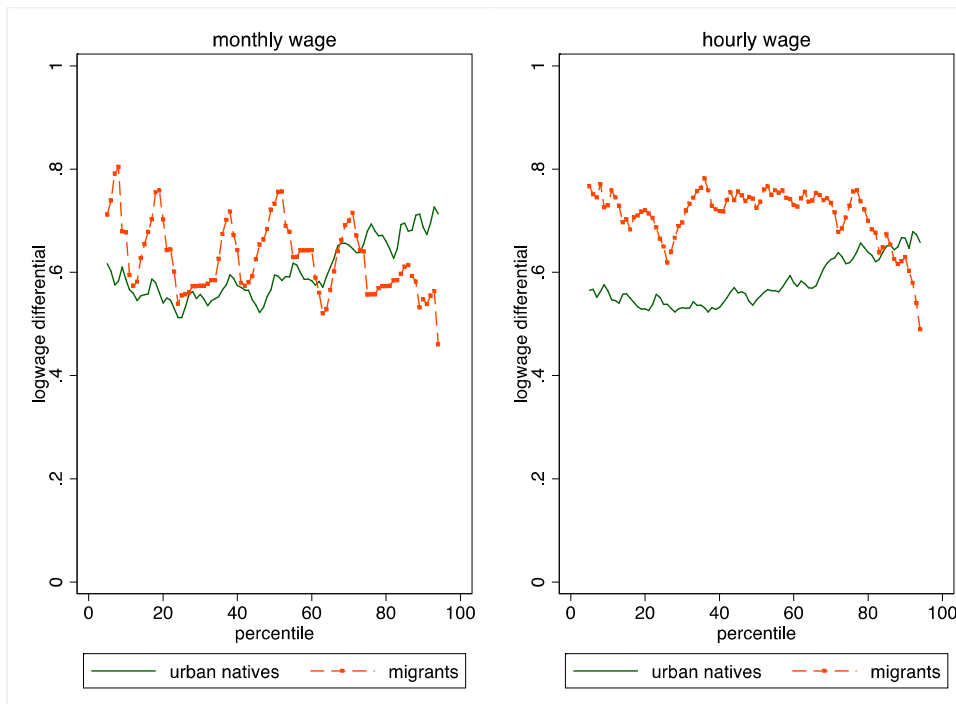
**Note:** Treated group refers to migrants and untreated group refers to urban natives.

## Appendix Figure 2 Robust Check: Samples in the Same Province

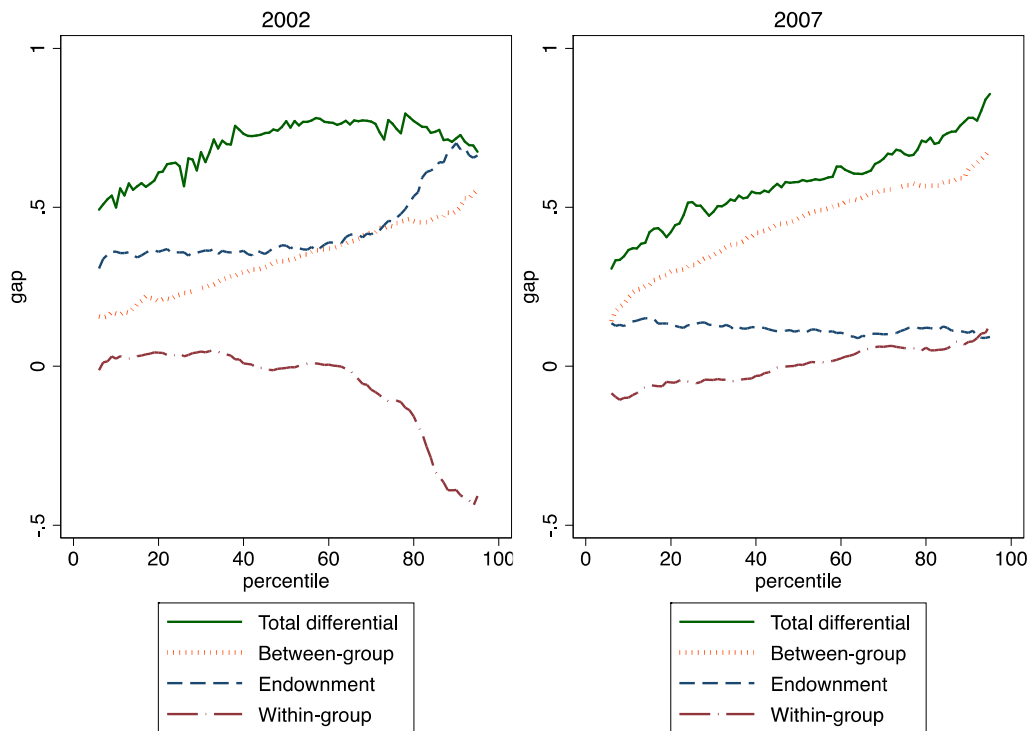
### 1) Logarithm of Wage Differentials between Migrants and Urban Natives by Percentile, 2002-2007:



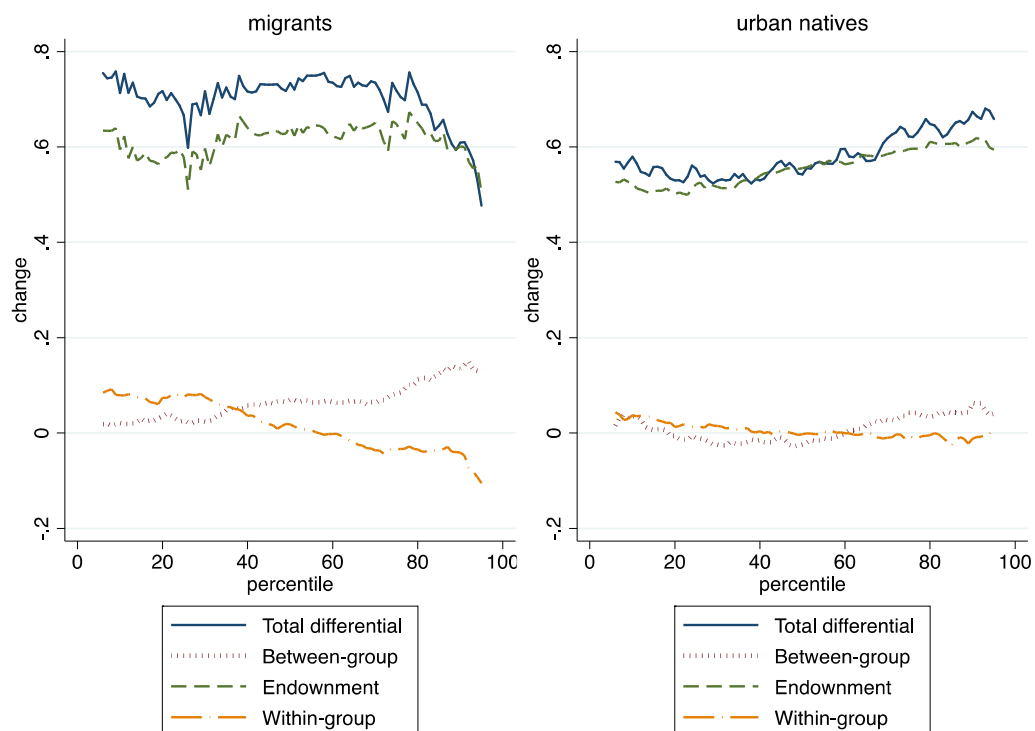
### 2) Changes in Logarithm of Wages for Migrants and Urban Natives by Percentile, 2002-2007



### 3) AKK Decompositions Wage Gap between Migrants and Urban Natives: 2002 and 2007

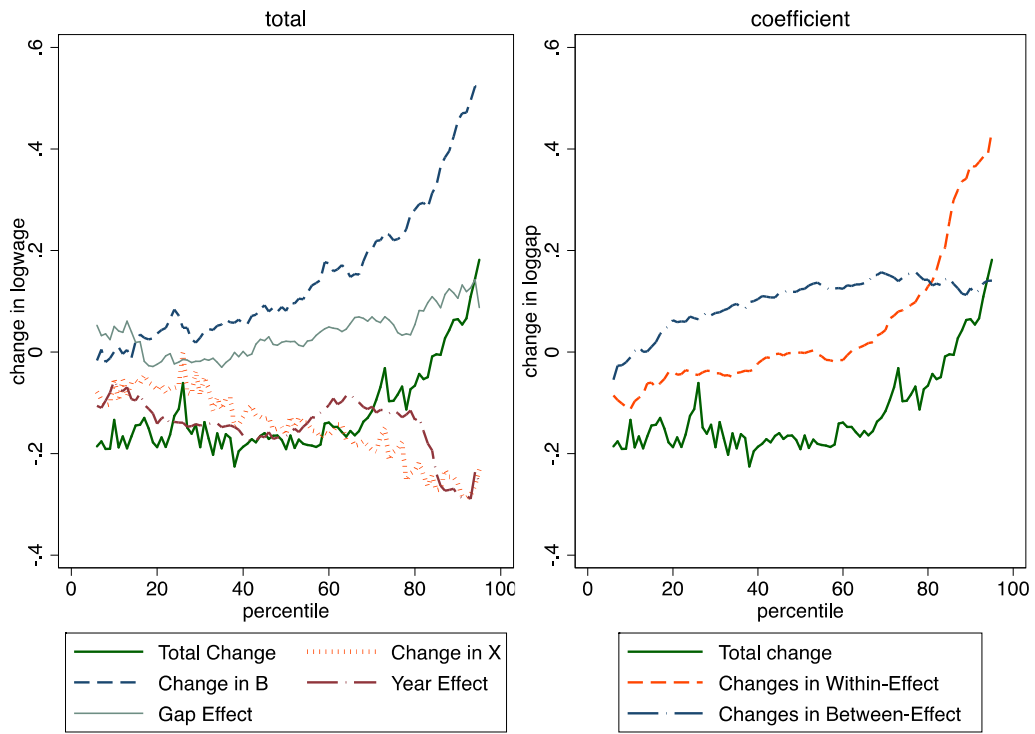


### 4) AKK Decomposition on Wage from 2002 to 2007





### 5) SW Decomposition on Wage Gap



**Data source:** China Household Income Project, 2002 and 2007.