CHINESE LABOR EARNINGS, ECONOMIC SECTORS, AND INDIVIDUAL CHARACTERISTICS FROM 2010 TO 2012

A Thesis

Presented to the Faculty of the Graduate School

of Cornell University

In Partial Fulfillment of the Requirements for the Degree of

Master of Science

by

Yu Shen

February 2016

ABSTRACT

This thesis investigates first, whether Chinese labor earnings increased, and if there was an overall increase, whether each laborer enjoyed the same increase from 2010 to 2012; second, what the relationship between the growth and inequality in labor earnings of each economic sector and the growth and inequality in overall labor earnings was; third, how employment in economic sectors and demographic factors affected the mobility and inequality in individual labor earnings.

BIOGRAPHICAL SKETCH

Yu Shen is currently in her third year of study at the Charles H. Dyson School of Applied Economics and Management in Cornell University. In January 2016, she will graduate with a Master of Science degree, with a major concentration in economics of development and a minor concentration in econometrics and economic statistics.

ACKNOWLEDGMENTS

I sincerely thank Professor Arnab K. Basu and Professor Yongmiao Hong for their valuable advice, full support, and warm encouragement. I also wish to express my gratitude to all the Cornell professors and staff who have helped during the past two and a half years. Without these people, it is impossible for me to complete this thesis.

TABLE OF CONTENTS

BIOGRAPHICAL SKETCH iii
ACKNOWLEDGMENTS iv
TABLE OF CONTENTS v
1. Introduction 6
2. Framework 11
2.1. Data 11
2.2. Definitions of labor and earnings 13
2.3. Measurement of growth and inequality 16
3. National growth and inequality 17
3.1. National growth 18
3.2. National inequality 20
4. Quantitative analysis of contributions of economic sectors 24
4.1. Economic sector characteristics description 25
4.2. Accounting for national labor earnings growth 28
4.3. Accounting for national labor earnings inequality 30
4.3.1. Methodology 30
4.3.2. Contributions 32
4.3.3. Elasticity 36
5. Impacts of employment in each economic sector and demographic factors 40
5.1. Cross-section data regressions 40
5.1.1. Regional labor earnings distributions 40
5.1.2. Model 43
5.1.3. Growth and inequality of labor earnings by economic sectors 46
5.1.4. Individual labor earnings inequality 54
5.2. Panel data regression 57
6. Labor earnings mobility 63
6.1. Labor earnings subgroups by quantiles 64
6.2. Macro mobility 67
6.3. Conditional micro mobility 69
6.3.1. Model 69
6.3.2. Impacts 71
7. Conclusion 73
REFERENCES 100

1. Introduction

From 2009 to 2011, World Bank data[1] showed that the GDP of China grew by 20.85% at market prices based on constant 2005 U.S. dollars, and the household final consumption expenditure[2] increased by 18.40% at the same time. These two impressive numbers indicate that the size of economy of China has risen, and the living standard of Chinese people has improved for these two years. However, as development economics researchers, we have to ask what kind of income or consumption distributions were behind the overall growth, and whether this growth had translated to improved prosperity or a reduction of inequality at the household level (Basu, 2013).

This paper analyzes three issues regarding labor earnings in China between 2010 and 2012. First, did labor earnings increase from 2010 to 2012, and if there was an overall increase, did each laborer enjoy the same increase? Second, how did the growth and inequality in each economic sector contribute to the growth and inequality in national labor earnings? Third, how did employment in economic sectors and laborer characteristics affect individual labor earnings differences and mobility?

The Kuznets hypothesis, as an inspiration for this study, was proposed in 1955. That is as growth takes place, inequality of a distribution of mature expenditure units[3] rise sharply

[1] Source: World Development Indicators.

[2] Household final consumption expenditure is the market value of all goods and services, including durable products, purchased by households.

[3] According to Kuznets (1955), mature expenditure units should satisfy five specifications. "First, the units for which incomes are recorded and grouped should be family-expenditure units, properly adjusted for the number of persons in each-rather than income recipients for whom the relations between receipt and use of

for a certain period and decline thereafter as the counteracting factors start taking effect. He speculated that the two main forces that lead to increasing inequality were concentration of savings by the rich and a process of industrialization and urbanization, while counteracting factors were legislative interference and "political" decisions, a progressively diminishing top proportion, rapid growth of younger industries, and importance of service income.

For the past sixty years, there has been a considerable debate regarding the validity of the Kuznets' inverted U relationship between growth and inequality. For instance, Glomm and Ravikumar (1998) argued theoretically that the inverted U shape of Kuznets curve could be formulated as a result of short-run increasing returns to scale and human capital accumulation. Meanwhile, Aghion, Caroli, and García-Peñalosa (1999) indicated that trade liberalization could result in both negative and positive impact on labor earnings inequality by a reduction in the skill premium and an improvement in productivity of skilled workers. Empirically, the inverted U shape of inequality dynamics Kuznets stated in 1955 has also been widely tested with cross-sectional data, panel data, and time series data. It turned out that the Kuznets curve hypothesis was verified in some research, while in others, an ordinal U shape, or a no statistically significant quadratic showed up (Fields, 2001).

---

income can be widely diverse. Second, the distribution should be complete. Third, if possible we should segregate the units whose main income earners are either still in the learning or already in the retired stages of their life cycle-to avoid complicating the picture by including incomes not associated with full-time, full-fledged participation in economic activity. Fourth, income should be defined as it is now for national income in this country. Fifth, the units should be grouped by secular levels of income, free of cyclical and other transient disturbances."

It is worthy to investigate the characteristics of Chinese income distributions under continuous rapid growth, and much research has already been conducted. Sicular (2013) pointed out the trend of inequality with growth and identified sources of inequality. In particular, Sicular argued that compared to the poor, incomes of the rich were rising faster in China. Two sources of savings concentration by the rich were revealed at the same time: the large income gap between urban and rural households, and the creation of private property, which recently has become a focus in development economics. Kanbur and Zhuang (2013), adopting Kuznets' hypothesis as a foundation, focused on the impact of urbanization and concluded that urbanization helped reduce income inequality in China, while urban-rural income gap and rising national inequality were important contributors to inequality between 1990s and 2000s. The 2012 OECD analysis investigated this relationship from the standpoint of legislative interference and "political" decisions and implied the fact that a few state-owned enterprises holding dominant market shares in some sectors, contributed to higher inequalities and lower long-term growth. It also indicated that both unequal tax compliance and tax breaks that benefited high-income recipients, were leading to higher inequalities. Kanbur and Zhang (2005) displayed the driving forces behind three peaks of regional real consumption inequality in the last fifty years during periods of the Great Famine in late 1950s, the Cultural Revolution in late 1960s and 1970s, and the openness and global integration in late 1990s. They found that demographic factors, industry structure, and policy variables, such as the degree of decentralization and the degree of openness, accounted for rural-urban gap and inland-coastal disparity respectively.

Usually, most papers analyzing the relationship between Chinese inequality and growth use overall income or consumption rather than specific labor earnings. The advantage of overall consumption is that it is an accurate measurement of individual living standard as influences of all types of redistributions are counted. Meanwhile, overall income inequality reflects the effects of private property ownership. Further, these two kinds of inequality statistics can be well combined with macroeconomic phenomena in research, such as growth, urbanization, and regional development gap. However, there is a relative lack of papers investigating the relationship between growth and inequality of subpopulations. This paper then concentrates on one of significant subpopulations – labor. According to Kuznets (1995), "at any given time, only a limited part of the income differential of a top group is accounted for by the concentration of property yields: much of it comes from the high level of service income (professional and entrepreneurial earnings and the like)". This stresses the significance of labor earnings in overall income structure. Hence, research on labor earnings is an indispensible and effective approach to understanding income distributions and the whole economy of any country.

Taking the Kuznets' hypothesis and vast literature of this topic thereafter as a starting point, this thesis analyzes the growth, inequality, and mobility in labor earnings, and impacts of specific factors on these economic phenomena in China between 2010 and 2012. I analyze the policy implications of my findings as well. It is natural for this paper to begin with asking whether labor as a group has shared the prosperity, and whether each individual laborer has benefited or suffered equally? The second, more complex problem of this paper would be explaining the growth and inequality of labor earnings from the

perspective of economic sectors and individual demographic factors. Specifically, first, this paper quantitatively investigates how sector-specific within-group inequalities, sector-specific labor earnings shares, and sector-specific population shares contributed to national labor earnings inequality changes between 2010 and 2012. Then, the paper asks differences in labor earnings levels across economic sectors, and how demographic factors affected individual labor earnings. Finally, this paper reports quantile subgroup labor earnings changes, macro mobility, and conditional micro mobility. In detail, the analysis explores labor earnings dynamics of the top bracket, middle class, and the bottom bracket, the existence of earnings mobility. Likewise, impacts of employment in each economic sector and individual characteristics will be emphasized. Thus, empirical results illustrate what determined labor earnings differences and mobility.

The structure of this paper is as follows. Section 2 introduces data sources, definitions of labor and earnings, and measurement of growth and inequality. Section 3 presents basic features of national labor earnings distributions and general growth and inequality measurements for the two periods. Section 4 analyzes how sector-specific within-group inequalities, sector-specific labor earnings shares, and sector-specific population shares contributed to national labor earnings inequality changes. Section 5 shows how employment in economic sectors and demographic factors affected labor earnings inequality empirically. Section 6 investigates the possibility of obtaining a higher labor return by looking into labor earnings mobility of China. Section 7 talks about corresponding policy interventions and concludes main findings and limitations of the analysis.

2. Framework

2.1. Data

The data used by this paper are mainly from China Family Panel Studies (CFPS), funded by 985 Program of Peking University and carried out by the Institute of Social Science Survey of Peking University. To conduct labor earning analysis, target population of this paper is adult respondents of CFPS aged 16 and above in 25 provinces, municipalities, or autonomous regions of China, excluding Hong Kong, Macao, Taiwan, Xinjiang, Tibet, Qinghai, Inner Mongolia, Ningxia and Hainan. There are 33600 adult observations in the 2010 household studies, and 35719 adult observations in the 2012 household studies. Specifically, China Family Panel Studies (CFPS) provide us with information about employment, occupations, labor earnings, and demographic factors of adult respondents for the periods -- 2009-2010 and 2011-2012.

Since there are differences in consumer prices among 25 provinces, municipalities, or autonomous regions over two years, in addition to normal labor earnings, real labor earnings are crucial in understanding the growth and inequality in labor earnings across regions. I use the method introduced by Brandt and Holz (2006) to calculate living expenditure and spatial price indexes in China from 2010 to 2012. Consumer price of the defined basket of Beijing in 2010 is set as a baseline. Information on time series

consumer price indexes and living expenditure of a standard basket across 25 areas from 1990 to 2000 are taken from datasets of National Bureau of Statistics of China and results of the paper of Brandt and Holz. At this stage, monetary values of labor earnings across 25 administrative regions over two years can be obtained directly by utilizing normal labor earnings and spatial consumer price indexes. Further, sampling weights are used for the observations to ensure national representativeness of the survey samples. Applicable sampling weights are achieved after non-response adjustment, post-hoc stratification adjustment, and trimming adjustment to sampling design weights (Xie, 2012).

Occupations of labor are classified into twenty economic sectors in this paper according to definitions of GB/T 4754-2002. GB/T 4754-2002 is the industrial classification system for national economic activities promulgated by the National Bureau of Statistics of China. It is one of industrial classification systems applied in China Family Panel Studies either. There are twenty sectors: agriculture, forestry, livestock, and fishery; mining; manufacturing; production and distribution of electricity, gas, and water; construction; transport, storage, and postal service; communication, computer engineering, and software; wholesale and retail trade; accommodation and catering; finance; real estate; leasing and business service; R&D, technical service, and geologic prospecting; management of water conservancy, environment, and public facilities; household service and other service; education; health, social security, and social welfare; entertainment, culture, and sports; public administration and social organizations; and international organizations.

2.2. Definitions of labor and earnings

Following the concept of "minimally consistent data" (Fields 1991; Anand and Kanbur 1993; Deininger and Squire 1996), the China Family Panel Studies (CFPS) datasets are adopted, which as mentioned above, are "based on actual household surveys or censuses with national coverage". To reach the other criterion for "minimally consistent data", this part concentrates on defining labor and earnings consistently between 2010 and 2012 in China.

To begin with, definition of labor in this paper is as follows. First, let us limit the analysis to working adults. Information gathered from the question: "Do you have a job currently?" are used to identify employment status of the respondents. Apart from the first employment definition above, the second employment definition is provided by the 2011-2012 survey. By the more concrete definition, an individual is identified as employed if (1) an individual "had worked for at least one hour last week", (2) an individual "was at that time on temporary vacation, sick leave or other vacation, or on-the-job training and would return to the original job position in a certain period or within six months", and (3) an individual "was at that time in an off-season of his/her own business, or agricultural work, and would resume after a while". However, the simple question: "Do you have a job currently?" was included in both household survey studies. Thus, this definition guarantees that the target populations and their labor earnings distributions are comparable. Further, each worker may engage in more than one occupation at the same time. Workers as a social class comprise agricultural laborers,

self-employed agricultural workers, non-agriculture self-employed individuals, non-agriculture employees, and unpaid family business helpers. If an individual is defined as an agricultural laborer, then the worker allocates more time to farm work than other occupations of the worker. However, I distinguish agricultural laborers, employees, and unpaid family business helpers from self-employed agricultural workers, non-agriculture self-employed individuals, because the focus of this research is to investigate the growth and inequality of labor earnings exclusively, thus, not having to worry about capital, land ownership, or other private properties.

Specifically, for the period 2009-2010, 49.84 percent of the national adult population had a job at that time. Among the 49.84% working people, 43.14% workers were laborers, 43.15% of them were self-employed agricultural workers, and 10.62 % of them ran their own business. Thus, 21.50 percent of the national adults, who were in employment and worked as labor primarily in 2010, become our target population. For the period 2011-2012, 53.96 percent people had a job at that time, according to the first employment definition above. Among all the people in employment, 29.99% were self-employed agricultural workers, 1.25% workers were agricultural laborers, 39.95% workers were waged employees, 8.11% workers ran their own business, and 0.59% workers were unpaid family business helpers. Hence, 20.36 percent of the national adults become our target population for 2012. If the second employment standard is adopted, 63.73% people became in employment. Then 37.12% of them were mainly working as self-employed agricultural workers, 1.65% of them were agriculture laborers, 29.63% workers were waged employees, 7.83% workers ran their own business, and 0.68% workers were

unpaid family business helpers. Comparing these two sets of numbers, we find that when the second employment definition is used, percentages of self-employed agricultural workers, agriculture laborers, and unpaid family business helpers of working people increased while percentages of waged employees and businessmen decreased. Such difference might happen as laborers inclined to believe that they were not in employment if they were in regular off-season periods, or fewer working hours were required per week, or fewer returns were paid for their efforts.

Now let's turn to labor earnings. Labor earnings in this paper are yearly monetary compensation to adult labor for their main occupations. Hence, yearly labor earnings consist of regular payments, merit payments, overtime payments, various bonuses, and goods received from employers. Labor earnings from second job, part-time job, temporary job, and other labor work have not been included so that impact of each economic sector on labor earnings can be identified clearly. Naturally, property income, subsidies, pension, and other transfer income do not count, as only compensation for main occupation work matters. For instance, income of self-employed agricultural workers from their own land, water areas and other properties is not considered as labor earnings. However, by implication, wages for agricultural work paid by employers count. Some general descriptions for labor earnings here help understand how earnings of 2011 - 2012 period were comparing with that of 2010 - 2011 period. In 2010, including zero wages, the 2010 average normal labor earnings were 22861.01 yuan per year, and standard deviation of this distribution was 23798.07 yuan. In 2012, average normal labor earnings were 26402.55 yuan per year, and standard deviation was 29385.26 yuan. Thus,

both normal labor wage mean and its standard deviation in 2012 were larger than those in 2010. To speak of invalid answers, there are mainly three types of invalid answers in labor earnings datasets from the family panel studies: no response, “I do not know”, and “Not apply”. Specifically, 5.07% of target population provided invalid answers to labor earnings studies in 2010, and 4.72% adult labor provided invalid answers in 2012.

2.3. Measurement of growth and inequality

Labor earnings distributions over years have been identified when the definition of labor earnings is fixed. As a result, various statistics can be calculated to summarize observations of target variables. Two groups of statistics are essential in this paper: growth measurements and inequality measurements. The growth of individual labor earnings is mainly evaluated by absolute and relative changes in specific labor earnings, while the growth of group labor compensation is measured by absolute and relative changes in average labor earnings due to the difference between sample populations of two periods. When labor earnings levels are discussed, absolute changes are adopted to avoid overestimating improvements or declines in labor earnings of the poor. On the other side, relative changes in labor earnings are utilized to quantify impacts of economic sector characteristics, employment in each economic sector, and individual characteristics. To rank a variety of populations in terms of inequality, Lorenz criterion (Lorenz, 1905) is used. Specifically, strongly-Lorenz-consistent inequality measures: Gini coefficient, Theil’s T index (Theil, 1967), and coefficient of variation; and weakly Lorenz-consistent measures: labor earnings share of the richest R percent, labor earnings

share of the poorest P percent, and relative mean deviation are calculated to describe inequality levels of distributions from diverse perspectives. Since these measures are Lorenz-consistent, then they also satisfy four properties of relative inequality measures (Foster, 1985): symmetry, homogeneity, population homogeneity, and Pigou-Dalton transfer principle (Pigou, 1912; Dalton 1920).

Here are explicit expressions of the inequality measures mentioned above, following measures in Sen (1997) and Fields (2001). Observations are ordered from the lowest labor earnings to the highest. And x_i = labor earnings of the *i*th observation, μ_x = average labor earnings, σ_x = labor earnings standard deviation, n^Q = *Q*th percentile, and n = population size. Then,

Gini coefficient: $G = -\frac{(n+1)}{n} + \frac{2}{n^2\mu_x}\sum_{i=1}^{n} ix_i$,

Theil's T index: $T_T = \frac{1}{n}\sum_{i=1}^{n}\frac{x_i}{\mu_x}\ln(\frac{x_i}{\mu_x})$,

Coefficient of variation: $c_v = \sigma_x/\mu_x$,

Labor earnings share of the richest R%: $S_R = \frac{\sum_{i=n^{(1-R)}}^{n} x_i}{n\mu_x}$,

Labor earnings share of the poorest P%: $S_P = \frac{\sum_{i=1}^{n^P} x_i}{n\mu_x}$,

Relative mean deviation: $RMD = \frac{\sum_{i=1}^{n}|x_i-\mu_x|/n}{\mu_x}$.

3. National growth and inequality

3.1. National growth

With nonzero real labor earnings distributions in 2010 and 2012, probability density curves and Lorenz curves are obtained for these two years. In graph 1, we can observe that comparing with the 2010 labor earnings probability density curve, the maximum of the 2012 labor earnings probability density curve decreased, and more laborers were in middle class and the top bracket. However, in graph 2, the Lorenz curves of 2010 labor earnings distribution and 2012 labor earnings distribution cross.

After observing the whole picture of these two years labor earnings distributions, following part of this section utilizes calculated statistics to describe and compare the growth and inequality of labor earnings distributions quantitatively. Poverty issue will not be elaborated on for several reasons. First, the percentage of adult labor was 21.50% in 2010 and 20.36% in 2012. As adult labor is a subset of the whole Chinese population, poverty statistics of adult labor earnings samples were not representative. Second, main occupation labor earnings were just a part of total individual income. There are also other occupation labor earnings, private property income, transfer income, and pension. Third, even complete individual income is also not equivalent to individual consumption. Adult equivalent consumption is a better indicator of individual living standard, as the influence of consumption economies of scale and intergenerational wealth accumulation. However, zero labor earnings percentages of adult labor populations are listed to complete the analysis of this paper. Concretely, 5.07% of target population earned zero wages in 2010, and 1.40% of target population earned zero wages in 2012. Two possibilities of zero

wages are as follows. First, zero wages laborers may be who did work but not obtain corresponding returns, such as unpaid family business helpers. Second, zero wages, the same as invalid answers, may come from dishonest answers, recall errors, rounding, and other types of survey measurement errors as well. To calculate growth statistics and inequality statistics, two groups of data are mainly utilized: normal labor earnings not including zero wages and real labor earnings not including zero wages. Meanwhile, statistics calculated using normal labor earnings observations including zero wages and real labor earnings observations including zero wages, are available in the footnotes.

Comparing two years statistics, for either normal labor earnings or real labor earnings, there was growth in overall labor earnings average and labor earnings average of the richest 20 percent workers. However, there was a decrease in labor earnings average of the poorest 20 percent workers. In detail, not using zero wages, the 2010 national normal labor earnings mean was 24130.35 yuan, and 2012 national normal labor earnings mean was 26796.73 yuan. Not using zero wages, in 2010, the normal labor earnings average of the poorest 20 percent workers was 8,156.06 yuan, while the normal labor earnings average of the richest 20 percent workers was 53,436.66 yuan. Then, average earnings of the rich had 6.6 times as much money as average earnings of the poor. Not using zero wages, in 2012, means[4] calculated from normal labor earnings data without zero wages

[4] Using zero wages, in 2010, the average normal labor earnings of the poorest 20 percent workers was 5,509.50 yuan, while the average earnings of the richest 20 percent was 52,820.36 yuan. Thus, average normal earnings of the rich had nearly 10 times as many returns as that of the poor in 2010. Using zero wages, in 2012, the average normal earnings of the poorest 20 percent workers was 6,336.61 yuan, while the average normal earnings of the richest 20 percent workrers was 57,702.77 yuan. Thus, average normal labor earnings of the rich had around 9 times as many returns as that of the poor.

were similar with those calculated from normal labor earnings data using zero wages as a result of the small scale of the number of zero observations.

Then real labor earnings data not including zero wages are utilized to measure growth. Although absolute values of real labor earnings mean cannot provide an correct intuition on how much Chinese yuan laborers have earned from their main occupations, these numbers help us start to understand the differences between two years labor earnings in growth and inequality across regions. In general, real labor earnings averages did not decline as a result of growth. National real labor earnings mean was 31,276.17 yuan in 2010 and 32,170.32 yuan in 2012 respectively. Meanwhile, real labor earnings mean of the richest 20 percent workers increased from 68,275.88 yuan to 71,595.05 yuan. However, real labor earnings mean of the poorest 20 percent workers did decrease from 10,837.19 yuan to 7,608.28 yuan. Thus, the ratio of average real labor earnings of the rich to that of the poor changed from 6.30 to 9.41. Therefore, the gap between labor earnings share of the rich and labor earnings share of the poor became wider from 2010 to 2012. In detail, earnings share of the poorest 20 percent laborers in 2012 was 29.79% smaller than share in 2010, while earnings share of the richest 20 percent laborers in 2012 was 4.86% more than share in 2010. Further, labor earnings shares of the richest group and the poorest group in 2010 and 2012 indicate that labor earnings share of the middle class significantly increased during these two years. Naturally, the topic of next part is national inequality.

3.2. National inequality

Although applying the Lorenz criterion alone cannot compare inequality levels in two years, a variety of inequality measurements can be utilized to judge inequality levels of labor earnings distributions. The strongly Lorenz-consistent inequality measures -- Gini coefficient and Theil's T index, and the weakly Lorenz-consistent inequality measures – labor earnings share of the richest x percent and labor earnings share of the poorest y percent will be calculated in this part.

Based on normal labor earnings data not including zero wages, labor earnings share of the poorest 20 percent laborers became less, and labor earnings share of the richest 20 percent laborers became less as well. Meanwhile, the ratio of normal labor earnings share of the rich to share of the poor became larger. This result implies that normal labor earnings share of the middle class in China had increased. Thus, one weakly Lorenz-consistent measure -- labor earnings share of the poorest 20 percent, tells us that normal labor earnings distributions became more unequal, while the other -- labor earnings share of the richest x percent, does not. Specifically, following results are calculated. In 2010, the poorest 20 percent workers owned 6.76% total normal labor earnings, while the richest 20 percent workrers owned 44.29% total normal labor earnings. The ratio of normal labor earnings share of the rich to normal labor earnings share of the poor was 6.55. In 2012, statistics calculated using normal labor earnings data without zero wages were similar with those[5] calculated using normal labor earnings data with zero wages as a

[5] Using zero wages, in 2010, the poorest 20 percent workers owned 4.82% total normal labor earnings, while the richest 20 percent workers owned 46.21% total normal labor earnings. The ratio of normal labor earnings share of the rich to that of the poor was 9.59. Using zero incomes, in 2012, the poorest 20 percent workers owned 4.80% total normal labor earnings, while the richest 20 percent workers owned 43.71%

result of the small scale of the number of zero observations. Further, two strongly Lorenz-consistent inequality measures support the conclusion that normal labor earnings distribution became more unequal from 2010 to 2012. In detail, not using zero wages, in 2010, the Gini coefficient was 0.380, and its standard sampling variance bootstrap estimate was 0.006. The Theil's T index was 0.281, and its standard sampling variance bootstrap estimate was 0.014. In 2012, the Gini coefficient was 0.405, and its standard sampling variance bootstrap estimate was 0.008. The Theil's T index was 0.321, and its standard sampling variance bootstrap estimate was 0.020.

Likewise, except labor earnings shares of the poorest 20 percent workers, all inequality measures provide consistent judgments on inequality levels of real labor earnings distributions not using zero wages. They tell us that real labor earnings distribution became more unequal from 2010 to 2012. Based on real labor earnings[6], the poorest 20 percent workers shared less total real labor earnings, while the richest 20 percent workrers owned more from 2010 to 2012. At the same time, ratio of real labor earnings share of the rich to that of the poor became larger. Specifically, in 2010, the poorest 20 percent workers owned 6.93% total real labor earnings, while the richest 20 percent workrers owned 43.66% total real earnings. The ratio of real labor earnings share of the rich to real labor earnings share of the poor was 6.30. In 2012, the poorest 20 percent workers owned 4.73% total real labor earnings, while the richest 20 percent workrers

total normal labor earnings. The ratio of normal labor earnings share of the rich to that of the poor was 9.11.

[6] Using zero wages, in 2010, the poorest 20 percent workers owned 4.91% total real labor earnings, while the richest 20 percent workers owned 45.05% total real labor earnings. The ratio of real labor earnings share of the rich to that of the poor was 9.18. Using zero wages, in 2012, the poorest 20 percent workers owned 4.30% total real labor earnings, while labor earnings of the richest 20 percent workers accounted for 44.92% total real labor earnings. The ratio of real labor earnings share of the rich to that of the poor was 10.45.

owned 44.51% total real labor earnings. The ratio of real labor earnings share of the rich to real labor earnings share of the poor was 9.41. In 2010, the Gini coefficient was 0.366, and its standard sampling variance bootstrap estimate was 0.007. The Theil's T index was 0.255, and its standard sampling variance bootstrap estimate was 0.014. In 2012, the Gini coefficient was 0.398, and its standard sampling variance bootstrap estimate was 0.007. The Theil's T index was 0.313, and its standard sampling variance bootstrap estimate was 0.021. Further, in 2010, real labor earnings inequality were lower than normal labor earnings, and this implies that high earnings regions also had to accept higher prices for the specific basket. In 2012, comparing real labor earnings inequality results with normal labor earnings ones, we can find that according to labor earnings shares of the richest 20 percent workers and labor earnings shares of the poorest 20 percent workers, the inequality of real labor earnings distributions were higher; however, at the same time, from the standpoint of Gini coefficient and Theil's T index, inequality of real labor earnings distributions were lower than inequality of normal labor earnings distributions. Meanwhile, labor earnings variance became larger in 2012 than that in 2010 from perspectives of both coefficient of variation and relative mean deviation. While coefficient of variation is neutral toward quantile where transfer occurs (Atkinson 1970; Love and Wolfson 1976; Levy and Murnane 1992), Theil's T index increases sharper when transfer occurs to the poor other than the middle class or the rich (Love and Wolfson 1976; Levy and Murnane 1992), and Gini coefficient is more sensitive to labor earnings transfer occurring to the middle class (Atkinson 1970; Sen 1973; Love and Wolfson 1976; Levy and Murnane 1992). From 2010 to 2012, the relative changes in Theil's T index and coefficient of variation were 19.23% and 24.18% respectively; these

two relative changes were larger than the relative change in Gini -- 8.11%. This result implies that more unequal transfers happened among the poor other than the middle class or the rich during the two years. This conclusion is consistent with analysis above on average labor earnings and labor earnings shares of different quintiles.

From analysis above, it can be inferred that in general, the Lorenz-consistent labor earnings inequality in 2012 was larger than that in 2010. Meanwhile, the two years period witnessed an overall growth of labor earnings as well. If the Kuznets hypothesis is assumed to be true, then according to the inverted U hypothesis, it can be acquired that the growth and inequality of Chinese labor earnings has not reached the turning point yet between 2010 and 2012. However, labor earnings of the poor went in the opposite direction to labor earnings of both the whole population and the rich. Specifically, labor earnings average of the poor decreased, and labor earnings share of the poor decreased. In section 6, there are more findings about labor earnings characteristics of quintile subgroups.

4. Quantitative analysis of contributions of economic sectors

This section is about how economic sector characteristics contributed to overall labor earnings growth and inequality between 2010 and 2012. As mentioned above, GB/T 4754-2002 divides the labor population into twenty subpopulations by employment in economic sectors. Further, in this section, all the statistics are calculated by economic

sectors. That is to say individuals contained in the same subpopulation may be different for two years as a part of individuals were changing their occupations. Thus, statistics of each economic sector over years, such as subgroup labor earnings means and Theil's T indexes just indicate the growth and inequality of labor earnings for each economic sector over years, other than the growth and inequality of labor earnings for the identical subgroup consisting of exactly same individuals. Further, this section aims to examine how sector-specific within-group inequalities, sector-specific labor earnings shares, and sector-specific population shares contributed to national labor earnings inequality changes. However, without adding individual characteristics into analysis, the influence of employment in each economic sector cannot be detached.

4.1. Economic sector characteristics description

Before getting down to business, some attention is paid to zero wages to understand completely labor earnings distributions, although poverty issues will not be expanded. In 2010, 33.51%, 15.20%, and 9.00% zero-wage employees, who were adult laborers not receiving any wages, worked in the manufacturing sector, wholesale and retail trade sector, and health, social insurance, and social welfare sector respectively. While manufacturing sector and wholesale and retail trade sector were the first largest subgroup and the third largest subgroup by population, the number of employees working for the health, social insurance, and social welfare sector ranked tenth and accounted for 4.07% labor population. In 2012, 32.02%, 26.89%, and 16.84% zero-wage employees worked in the wholesale and retail trade sector, manufacturing sector, and accommodation and

catering sector respectively. While manufacturing sector and wholesale and retail trade sector were the first largest subgroup and the third largest subgroup by population, the number of employees working for the accommodation and catering sector ranked eighth and accounted for 3.71% labor population only.

Let us turn to population shares and labor earnings means of economic sectors. In 2010, not using zero wages, 30.01%, 10.03%, and 8.47% of Chinese adult laborers were working for the three most populous economic sectors: manufacturing sector, public administration and social organization sector, and wholesale and retail trade sector respectively. In 2012, not using zero wages, most adult laborers, accounting for 32.49%, 12.58%, and 9.67% of the population, worked in manufacturing sector, construction sector, and wholesale and retail trade sector respectively. Real labor earnings are used to make comparisons. From the perspective of average labor earnings, in 2010, not using zero wages, adult laborers of management of water conservancy, environment, and public facilities sector; finance sector; and R&D, technical service, and geologic prospecting sector earned the highest average annual real labor earnings at 63,417.29 yuan, 53,839.50 yuan, and 50,878.07 yuan respectively. Meanwhile, adult laborers of agriculture, forestry, livestock, and fishery sector; household service and other service sector; and accommodation and catering sector earned the lowest average annual real labor earnings at 18,000.79 yuan, 23,939.77 yuan, and 25,676.79 yuan. In 2012, not using zero wages, adult laborers of communication, computer engineering, and software service sector; finance sector; and R&D, technical service, and geologic prospecting sector earned the three highest average real labor earnings at 62,528.86 yuan, 54,583.50 yuan, and

49,567.39 yuan average annually. In the meantime, adult laborers of agriculture, forestry, livestock, and fishery sector; management of water conservancy, environment, and public facilities sector; and accommodation and catering sector earned the three lowest average real labor earnings at 18,634.74 yuan, 21,473.34 yuan, and 24,255.52 yuan annually.

To sum up, in 2012, construction sector became the second most populous sector instead of the public administration and social organization sector, while the other two populous sectors retained their ranks. As we can see, labor earnings of workers in high-tech sector and knowledge-intensive service sector were higher averagely, such as finance sector; and R&D, technical service, and geologic prospecting sector. Besides, average labor earnings of workers in management of water conservancy, environment, and public facilities sector dropped from the first rank to the nineteenth rank. This phenomenon may result from the consummation of a massive government spending triggered by a global financial crisis. On the other hand, labor earnings of workers in agriculture, forestry, livestock, and fishery sector; accommodation and catering sector; and household service and other service sector were relatively lower averagely. It was because most of low labor earnings workers concentrating in these three sectors serving as temporary or informal workers. However, lower average labor earnings for laborers working in an economic sector are not equivalent to lower labor earnings for individuals working the economic sector. Individuals working in sectors with low average labor earnings likely obtained as much returns as individuals with same demographic characteristics working in sectors with high average labor earnings.

4.2. Accounting for national labor earnings growth

National normal labor earnings without zero wages, increased by 2,666.38 yuan from 2010 to 2012. Furthermore, most of average normal labor earnings of laborers in different economic sectors had already risen along with the national labor earnings growth. However, there were still eight sectors out of total twenty economic sectors, in which laborers suffered decreases in average normal labor earnings. These eight economic sectors were construction sector; wholesale and retail trade sector; accommodation and catering sector; real estate sector; leasing and business service sector; management of water conservancy, environment, and public facilities sector; entertainment, culture, and sports sector; and other occupations sector. On the other hand, national real labor earnings without zero wages increased by 894.15 yuan from 2010 to 2012. There were ten sectors out of total twenty economic sectors, in which laborers underwent decreases in average real labor earnings. In addition to the eight sectors mentioned above, two more economic sectors were added into the list: R&D, technical service, and geologic prospecting sector and education sector. In detail, laborers in communication, computer engineering, and software service sector; health, social insurance, and social welfare sector; and mining sector enjoyed the three largest absolute real labor earnings growth by 30,325.68 yuan, 13,926.00 yuan, and 5,977.75 yuan. Further, management of water conservancy, environment, and public facilities sector; other occupations sector; and leasing and business service sector went through the three largest absolute real labor earnings declines by 41,943.95 yuan, 21,117.07 yuan, and 10,367.88 yuan.

There were three groups of economic sectors offering high labor earnings between 2010 and 2012. They were high-tech sectors and knowledge-intensive service sectors, such as communication, computer engineering, and software service sector; R&D, technical service, and geologic prospecting sector; finance sector; and education sector; and capital-intensive sectors, such as entertainment, culture, and sports sector; and mining sector. While workers of these sectors averagely earned high-level labor earnings during these two years, average labor earnings growth can be another story. Laborers in communication, computer engineering, and software service sector; health, social insurance, and social welfare sector; transport, storage, and postal service sector; mining sector; and finance sector enjoyed both high average labor earnings and high labor earnings growth between 2010 and 2012. Meanwhile, average labor earnings in education sector; R&D, technical service, and geologic prospecting sector; entertainment, culture and sports sector; leasing and business service sector; management of water conservancy, environment, and public facilities sector; and other occupations sector decreased between 2010 and 2012, although average labor earnings of laborers working in these industries were relative high among total twenty economic sectors for the two years. In conclusion, first industry and secondary industry were developing stably, while traditional service industry was going through a difficult time.

However, economic sector labor earnings changes should be combined with sector population shares to determine impacts of economic sector earnings changes on national labor earnings growth, because national average labor earnings are the sum of sector average labor earnings weighted by population shares. From 2010 to 2012, national real

labor earnings increased by 2.86%. Three largest positive contributions to national real labor earnings growth came from public administration and social organization sector; transport, storage, and postal service sector; and health, social insurance, and social welfare sector, and they led real labor earnings to increasing by 5.61%, 3.31%, and 3.27% relatively. Meanwhile, the three largest negative contributions came from construction sector; other occupations sector; and agriculture, forestry, livestock, and fishery sector, leading real labor earnings to decreasing by -8.72%, -2.81%, and -1.90% relatively.

4.3. Accounting for national labor earnings inequality

4.3.1. Methodology

This part illustrates how to measure the contributions of economic sector characteristics to labor earnings inequality. The impact of sector characteristics is broken down into three parts: impacts of sector subgroup labor earnings shares, sector subgroup population shares, and within-group inequalities across sectors. Besides, real labor earnings, not including zero wages, will be used for analysis below in section 4, section 5, and section 6. If other data samples are adopted, then there will be specific indications beforehand.

The Theil's T index is used to measure national labor earnings inequality L, as the Theil's T index is composed of weighted sum of within-group inequalities and between-group

inequality. Let S_i be the subgroup labor earnings share, P_i be the subgroup population share, and L_i be the within-group Theil's T index for the *i*-th economic sector, then:

$L = L(S_i, P_i, L_i) = L_W + L_B = \sum_i S_i L_i + \sum_i S_i \ln(\frac{S_i}{P_i})$.

To investigate impacts of economic sector labor earnings changes on national real labor earnings inequality quantitatively, derivatives of the function above of labor earnings shares, population shares, and within group Theil's T indexes are used to measure contributions of these three drivers between 2010 and 2012. This quantitative method has already been applied in Kanbur and Zhuang (2013). The Theil's T index -- $L(S_i, P_i, L_i)$ is differentiated as follows:

$dL = \sum_i A_{S_i} dS_i + \sum_i A_{P_i} dP_i + \sum_i A_{L_i} dL_i$,

where

$A_{S_i} = L_i + \ln\left(\frac{S_i}{P_i}\right) + 1$,

$A_{P_i} = -\left(\frac{S_i}{P_i}\right)$,

$A_{L_i} = S_i$.

Since coefficients A_{S_i}, A_{P_i}, and A_{L_i} are functions of labor earnings within-group inequality, subgroup population share, and subgroup labor earnings share, coefficients A_{S_i}, A_{P_i}, and A_{L_i} depend on values of labor earnings shares, population shares, and within-group inequalities. Thus, there are two groups of coefficients, if P_i, S_i, and L_i in the expressions are substituted with values of P_i, S_i, and L_i of 2010 data sample and 2012 data sample respectively. As shown above, impact of each driver is measured by

multiplying coefficient A_{S_i}, A_{P_i}, or A_{L_i} with the change in each variables P_i, S_i, or L_i from 2010 to 2012. Then a unique estimate of each coefficient is necessary to obtain absolute or percentage contribution to the change in national inequality. To solve this problem, the simple average of the two numerical results of each coefficient is used as estimate. However, according to Kanbur and Zhuang (2013), "the contributions will not add up to the actual change because of non-linearity and interaction effects and there will be a residual term".

Since elasticities of L tell us the percentage change in national inequality when one percentage change in the value of a driver happens, they are practical guidance for policy design. Thus, labor earnings share elasticity of inequality E_{S_i}, population share elasticity of inequality E_{P_i}, and within-group inequality elasticity of inequality E_{L_i} are computed below. The relative change of L can be decomposed into:

$dL/L = \sum_i E_{S_i} (dS_i/S_i) + \sum_i E_{P_i} (dP_i/P_i) + \sum_i E_{L_i} (dL_i/L_i)$,

where

$E_{S_i} = (S_i/L)A_{S_i}$,

$E_{P_i} = (P_i/L)A_{P_i}$,

$E_{L_i} = (L_i/L)A_{L_i}$.

4.3.2. Contributions

This section focuses on within-group inequalities across years, relative changes in within-group inequalities, and sensitivity to change of national Theil's T index with respect to

changes of subgroup labor earnings share S_i, subgroup population share P_i, and within-group inequality L_i.

First, let's begin with the Theil's T within-group inequality analysis. Since the number of laborers of each economic sector is different from others, to compare inequality levels of economic sectors, all the Theil's T indexes have been normalized so that they range from 0 to 1. From 2010 to 2012, Theil's T index of national real labor earnings rose from 0.0133 to 0.0163. In 2010, laborers in leasing and business service sector; other occupations sector; and communication, computer engineering, and software service sector suffered the highest Theil's T inequality levels at 0.0276, 0.0246, and 0.0236. Meanwhile, laborers in R&D, technical service, and geologic prospecting sector; education sector; and mining sector enjoyed the lowest Theil's T inequality levels at 0.0078, 0.0084, and 0.01. In 2012, laborers in health, social insurance, and social welfare sector; agriculture, forestry, livestock, and fishery sector; and communication, computer engineering, and software service sector went through the highest inequality levels at 0.0536, 0.0455, and 0.0405. At the same time, laborers providing invalid answers to employment in sectors; and laborers in production and distribution of electricity, gas, and water sector and transport, storage, and postal service sector enjoyed the lowest labor earnings inequality levels at 0.0094, 0.01, and 0.0115. Meanwhile, from 2010 to 2012, the three largest absolute increases in within-group inequality were 0.0408, 0.0334, and 0.0129, coming from labor earnings changes in health, social insurance, and social welfare sector; agriculture, forestry, livestock, and fishery sector; and communication, computer engineering, and software service sector. The three economic sectors were also

the sectors having the highest inequality levels in 2012. At the same time, the three largest absolute decreases in within-group inequality were -0.0092, -0.0076, and -0.0061, coming from labor earnings changes in leasing and business service sector; other occupations sector; and wholesale and retail trade sector. Two of the three economic sectors were the sectors having the highest inequality levels in 2010.

In conclusion, communication, computer engineering, and software service sector; health, social insurance, and social welfare sector; public administration and social organization sector; agriculture, forestry, livestock, and fishery sector; and construction sector went through high average labor earnings inequality, and high growth in average labor earnings inequality. Mining sector; education sector; R&D, technical service, and geologic prospecting sector; management of water conservancy, environment, and public facilities sector; and real estate sector also underwent high growth in average labor earnings inequality, although they had low average labor earnings inequality between 2010 and 2012. Thus, in general, an economic sector with more temporary and informal laborers and unskilled laborers had higher inequality levels. Meanwhile, laborers in high-tech economic sectors and knowledge-intensive economic sectors experienced high growth in average labor earnings inequality between 2010 and 2010.

Naturally, it is time to ask how changes in labor earnings within-group inequality contributed to the national labor earnings inequality change. The contributions of the other two driver groups -- labor earnings shares and population shares, will also be calculated to understand impacts of economic sectors characteristics comprehensively.

The three largest contributions to the national labor earnings inequality change came from changes in within-group inequality of health, social insurance, and social welfare sector, construction sector, and public administration and social organization sector, accounting for 35.11%, 28.10%, and 20.34% of national real labor earnings inequality growth. Further, the three largest contributions to the national labor earnings inequality change came from changes in subgroup population shares of public administration and social organization sector, education sector, and household service and other service sector, accounting for 71.58%, 54.02%, and 49.52% of national real earnings inequality growth. At last, the three largest contributions to the national labor earnings inequality change came from changes in labor earnings shares of construction sector, manufacturing sector, and communication, computer engineering, and software service sector, accounting for 151.87%, 73.07%, and 46.52% of national real labor earnings inequality growth. The impact of changes of each economic sector is the sum of contributions of labor earnings share, population share, and within-group inequality. Thus, changes of health, social insurance, and social welfare sector; construction sector; communication, computer engineering, and software service sector; manufacturing sector; and public administration and social organization sector had the five largest contributions to the national labor earnings inequality increase: 48.56%, 45.74%, 38.93%, 28.77%, and 24.46%. Meanwhile, wholesale and retail trade sector; transport, storage, and postal service sector; other occupations sector; education sector; and entertainment, culture, and sports sector had the five largest offsets against the national labor earnings inequality increase: -27.24%, -20.99%, -14.56%, -12.08%, and -9.74%.

4.3.3. Elasticity

Elasticities of inequality across sectors can help to better understand the impacts of economic sector characteristics. While within-group Theil's T index elasticities of inequality and labor earnings share elasticities of inequality were positive, population share elasticities of inequality were negative. Then, if the within-group Theil's T index or labor earnings share of a sector increases one percent, keeping values of other two drivers constant, there would be an increase in national labor earnings inequality. Meanwhile, one percent increase in population share of an economic sector would have negative marginal impact on national real labor earnings inequality. It is worth pointing out that since both sums of labor earnings shares and population shares across economic sectors are 100%, once population share or labor earnings share of one economic sector increases, the total population share or labor earnings share of the rest economic sectors would decrease by the same amount. Meanwhile, changes in within-group inequality of an economic sector vary independently.

Within-group Theil's T index elasticities of inequality are results of the interaction of labor earnings shares and Theil's T indexes. In 2010, only manufacturing sector within-group Theil's T index elasticity of inequality and wholesale and retail trade sector within-group Theil's T index elasticity of inequality were larger than 0.1. In 2012, only manufacturing sector within-group Theil's T index elasticity of inequality and construction sector within-group Theil's T index elasticity of inequality were larger than 0.1. Meanwhile, in 2010, within-group Theil's T index elasticities of inequality for

manufacturing sector; wholesale and retail trade sector; transport, storage, and postal service sector; public administration and social organization sector; and household service and other service sector were the five largest ones: 0.253, 0.120 0.089, 0.081, and 0.062. In 2012, within-group Theil's T index elasticities of inequality for manufacturing sector; construction sector; health, social insurance, and social welfare sector: public administration and social organization sector; and wholesale and retail trade sector were the five largest ones: 0.225, 0.151, 0.077, 0.077, and 0.074. Since changes in within-group inequality vary independently, then their impacts on national labor earnings inequality do not concur with impacts of changes in within-group inequality of other sectors. For instance, a 1% decline in the within-group inequality of manufacturing sector could lower the national labor earnings inequality by 0.253% in 2010.

Labor earnings share elasticities of inequality were larger than corresponding within-group Theil's T index elasticities of inequality generally for both years. In 2010, thirteen of all labor earnings share elasticities of inequality were larger than 0.1, while in 2012, ten of all labor earnings share elasticities of inequality were larger than 0.1. However, in both 2010 and 2012, national labor earnings inequality was elastic only in response to changes in manufacturing sector labor earnings share. Meanwhile, in 2010, labor earnings share elasticities of inequality in manufacturing sector; education sector; transport, storage, and postal service sector; public administration and social organization sector; and wholesale and retail trade sector had the five largest labor earnings share elasticities of inequality: 1.247, 0.485, 0.465, 0.449, and 0.415. In 2012, labor earnings share elasticities of inequality in manufacturing sector; construction sector; public

administration and social organization sector; wholesale and retail trade sector; and education sector had the five larges ones: 1.185, 0.517, 0.316, 0.295, and 0.265. Further, for labor earnings share elasticities of inequality, since the sum of labor earnings shares are 100%, when labor earnings share of one economic sector increases, the total labor earnings share of the rest economic sectors would decrease by the same amount. For example, although a 1% decline in labor earnings share of manufacturing sector could lower the national labor earnings inequality by 1.247% in 2010. However, if a 1% increase in labor earnings share of R&D, technical service, and geologic prospecting sector could happen at the same time, then the national labor earnings inequality would be raised by 0.024%. Thus, in total, the national labor earnings inequality would be lowered by 1.223%.

For negative population share elasticities of inequality, around half of them were smaller than -0.1. In 2010, absolute values of twelve of all population share elasticities of inequality were larger than 0.1. The five largest absolute values came from manufacturing sector; public administration and social organization sector; education sector; transport, storage, and postal service sector, and wholesale and retail trade sector. They were -1.084, -0.381, -0.366, -0.338, and -0.313 respectively. In 2012, absolute values of eight of all population share elasticities of inequality were larger than 0.1. The five largest absolute values came from manufacturing sector; construction sector; wholesale and retail trade sector; public administration and social organization sector; and transport, storage, and postal service sector. They were -0.999, -0.384, -0.263, -0.216, and -0.193 respectively. As we can see, two groups of economic sectors with the

five largest absolute values of population share elasticities of inequality were almost the same, apart from a little bit difference in the order. Besides, the sum of population shares is fixed at 100%. Then, when population share of one economic sector increases, population shares of some other economic sectors would decrease. For instance, a 1% increase in population share of manufacturing sector could lower the national labor earnings inequality by 1.084% in 2010. However, a 1% decline in population share of wholesale and retail trade sector could happen at the same time, then the national labor earnings inequality would increase by 0.313%. In the end, the national labor earnings would be lowered by 0.771%.

Therefore, according to analysis above, there were three reasonable and effective approaches to decreasing national labor earnings inequality. First, governments can design policy to decrease subgroup inequalities, especially focusing on reducing manufacturing sector within-group inequality, wholesale and retail trade sector within-group inequality, and public administration and social organization sector within-group inequality. Second, policy makers can choose to decrease labor earnings shares of sectors having larger labor earnings share elasticities of inequality, and increase labor earnings shares of sectors having smaller labor earnings share elasticities of inequality at the same time. Third, policy should encourage population growth in sectors having larger absolute values of population share elasticities of inequality. However, attention should be paid to policy efficiency as well. Although an elasticity of inequality could quantitatively indicate the percentage change in labor earnings inequality when one percentage change in within-group Theil's T index, labor earnings share, or population share of an economic

sector happened, the direct costs, other costs and corresponding externalities of making one percentage change in each driver occur are unknown and may vary significantly.

5. Impacts of employment in each economic sector and demographic factors

Analysis above has introduced the general picture of the growth and inequality of Chinese labor earnings, and how labor earnings characteristics of economic sectors affected the growth and inequality of Chinese labor earnings between 2010 and 2012. Following analysis at national level and economic sector level, impacts of employment in each economic sector and demographic factors on labor earnings inequality are investigated at individual level in this section. Cross-section data regressions and panel data regression help to understand exclusive impact of employment in each economic sector or each demographic factor by controlling the rest of independent variables. Therefore, between-group inequality of each sector and within-group inequalities across sectors can be explained clearly.

5.1. Cross-section data regressions

5.1.1. Regional labor earnings distributions

With cross-section data regressions, impacts of employment in each economic sector and demographic factors on real labor earnings are estimated at both national and regional

level. Hence, before getting to the point, it is necessary to acquire a further understanding of probability density of labor earnings and Lorenz curves for the whole China and four regions of China. There is already introduction to national probability density curves and its Lorenz curves. Thus, this part focuses on probability densities of labor earnings and their Lorenz curves for four regions of China.

Labor earnings probability density curves of four regions in 2010 are plotted together in graph 3. In the graph, the four probability density curves almost overlapped completely. Particularly, in eastern China, there were the most labor earnings observations concentrating at the vertex of probability density curve. Meanwhile, the probabilities of the bottom bracket observations were relative low, but also the curve had a relative heavy tail. All labor earnings probability density curves of four regions in 2012 are added to one graph as well. In 2012, as shown in graph 4, in general, there appeared a growing divergence among the probability density curves of four different regions. Further, maximums of probability densities in 2010 were lower than those in 2012. Particularly, the maximum of probability densities of western China labor earnings became the largest among four regions. In western China, more labor earnings observations got into the top bracket as well, and there was even a slight rise at the right tail of its probability density curve.

In graph 5, labor earnings probability density curves in 2010 and 2012 were put in the same coordinate system for each region. Generally speaking, as seen from graph 5, real labor earnings increased for each region from 2010 to 2012. All regional labor earnings

probability density curves in 2012 were more flat than corresponding curves in 2010. In 2012, less labor earnings observations crowded around the vertexes, but also more laborers stayed in the middle class. Meanwhile, there were a few more labor earnings observations showing up at the bottom bracket. For northern China and Eastern China, 2010 labor earnings probability density curves had heavier tails than 2012 labor earnings probability density curves, while for western China and central China, 2012 labor earnings probability density curves had heavier tails. In graph 6, the Lorenz curves of labor earnings in 2010 and in 2012 are compared with the perfect inequality line for each region of China. For western China, the 2010 labor earnings distribution clearly Lorenz-dominated the 2012 labor earnings distribution, while for eastern China, the 2012 labor earnings distribution slightly Lorenz-dominated the 2010 labor earnings distribution. Further, Lorenz-crossings showed up for Northern China and Central China.

Furthermore, Gini coefficients and Theil's T indexes are listed in table 9 for the four regions of China. The Gini coefficient and the Theil's T index of eastern China were highest among four regions in 2010, while the Gini coefficient and the Theil's T index of western China were highest among four regions in 2012. As expected, for western China, the Gini coefficient and the Theil's T index in 2012 were higher than these two statistics in 2010, while for eastern China, the Gini coefficient and the Theil's T index were higher in 2010. Meanwhile, for northern China and central China, the Gini coefficients and the Theil's T indexes of both regions in 2012 were higher than these two statistics in 2010, although their Lorenz curves in 2010 and in 2012 crossed.

5.1.2. Model

The OLS estimators are applied to examine impacts of demographic factors for China and for four regions of China – northern China, eastern China, western China, and central China in 2010 and 2012 respectively. The labor earnings regression equation is as follows:

$$logy_i = \boldsymbol{\beta}'\boldsymbol{x_i} + \boldsymbol{\delta}'\boldsymbol{h_i} + \varepsilon_i$$

Regressor $\boldsymbol{x_i}$ is a vector of demographic factors of the *i*-th observation in the cross-section data. In 2010, $\boldsymbol{x_i}$ consists of gender, age, urban dummy, marital status dummy, retirement dummy, education, IQ score, father's education, and word test performance of the *i*-th observation. In 2012, $\boldsymbol{x_i}$ consists of gender, age, urban dummy, marital status dummy, retirement dummy, education, IQ score, series test performance, and the number of children of the *i*-th observation. First, it is common to examine whether labor earnings are affected by gender and age in literature. Second, Kanbur and Zhuang (2013) indicated there was a significant urban-rural income gap between the early 1990s and late 2000s, and that the widening in the urban-rural income gap contributed to 33% of the increase in national inequality. Hence, it is reasonable to add urban dummy into the regression equation to estimate impacts of residency in urban areas on labor earnings across regions between 2010 and 2012. Third, plenty of studies investigated whether education and ability enhanced individual wages, such as Mincer (1958), Hayashi (2000), and Griliches (1976). Here, education is measured by laborer schooling years, and the coefficient estimate of laborer schooling years is used to estimate the marginal returns on human

capital investment. Meanwhile, ability is measured by a combination of IQ score, word test performance, and series test performance in the regression equation to separate impacts of individual ability and education. IQ score of each respondent came from observations of interviewers, while word test performance and series test performance were evaluated through each respondent's correctness rate to correspondent problem sets. Forth, father's education, marital status, and the number of children are incorporated into demographic regressors to determine the impacts of family circumstances. Finally, following the third requirement to mature expenditure units as Kuznets (1955) stated, additional attention should be paid to earnings observations collected from laborers either in the learning or in the retired stages as the labor earnings were "not associated with full-time, full-fledged participation in economic activity". However, learning dummy variable would not be incorporated into demographic regressors since the impact of learning dummy variable on adult labor earnings was not significant between 2010 and 2012.

Meanwhile, regressor $\boldsymbol{h_i}$ in both 2010 and 2012 is a vector of economic sector dummy variables identifying where the *i*-th observation worked. Specifically, $\boldsymbol{h_i}$ consists of twenty economic sector dummy variables from **job_2** to **job_21** as its elements. Then, **job_2** to **job_21** represent dummy variables for agriculture, forestry, livestock, and fishery sector; mining sector; manufacturing sector; production and distribution of electricity, gas, and water sector; construction sector; transport, storage, and postal service; communication, computer engineering, and software sector; wholesale and retail trade sector; accommodation and catering sector; finance sector; real estate sector; leasing and business service; R&D, technical service, and geologic prospecting sector;

management of water conservancy, environment, and public facilities sector; household service and other service sector; education sector; health, social security, and social welfare sector; entertainment, culture, and sports sector; public administration and social organization sector; and other occupations sector respectively. The value of an economic sector dummy variable is one if the main occupation of a laborer is categorized into the economic sector. These twenty economic sector dummy variables of the *i*-th observation, along with individual demographic factors $\boldsymbol{x_i}$, segregate the impact of employment in each economic sector on labor earnings from impacts of within-group inequality sources at national level and regional level. Further, since semi-log form is typical of wage estimation equation (Hayashi, 2000) and the semi-log form well explains the relationship between labor earnings and regressors – demographic factors and economic sector dummy variables, the dependent variable is the natural logarithm of labor earnings -- $\boldsymbol{logy}$ for both years. Thus, the log-linear model is applied in labor earnings regression analysis.

To apply large-sample theory, according to Hayashi (2000), all the regressors should be orthogonal to the contemporaneous error term. However, this assumption could be violated with a strong likelihood. For instance, if the combination of IQ score, word test performance, and series test performance together could not measure ability errorlessly, then, "the OLS estimates of all the regression coefficients can be asymptotically biased". Hence, before OLS regressions are adopted for both years, the J statistic and C statistic based on the efficient two-step GMM are applied to test whether all the regressors are predetermined. In 2010, predetermined instruments that are not regressors but used for

testing overidentifying restrictions are healthiness, politeness, desperation level, people who took care the respondent when he or she got sick, and the closet friend of the respondent. In 2012, they are workout frequency, immediate word recall test performance, delayed word recall test performance, people who took care the respondent when he or she got sick, and depression level. As a result of missing data, there are 3,486 observations for the 2010 national regression, and 3,227 observations for the 2012 national regression.

5.1.3. Growth and inequality in labor earnings by economic sectors

This part analyzed implications of coefficient estimates of economic sector dummy variables. Since regression models separate the impact of employment in each economic sector on labor earnings from impacts of demographic factors, coefficient estimates of economic sector dummy variables indicate standard labor earnings of each economic sector, the growth of standard labor earnings of each economic sector, and labor earnings inequality resulting from distinguished standard labor earnings of each economic sector between 2010 and 2012. To satisfy the rank condition, agriculture, forestry, livestock, and fishery sector dummy variable; management of water conservancy, environment, and public facilities sector dummy variable; and entertainment, culture and sports sector dummy variable for northern China are omitted in 2010 regression model. Also, leasing and business service sector dummy variable and R&D, technical service, and geologic prospecting sector dummy variable for western China are omitted in 2010 regression model. Meanwhile, it is impossible there are more than one economic sector dummy

variables' values being one for an observation. Further, in 2010, all coefficient estimates of economic sector dummy variables were at the 1% significance level, except that the coefficient estimate of agriculture, forestry, livestock, and fishery sector dummy variable for eastern China was 2.208 at the 5% significance level, and that the coefficient estimate of other occupations sector dummy variable for western China was 3.052 at the 5% significance level. In 2012, all of coefficient estimates of economic sector dummy variables were at the 1% significance level, except that the coefficient estimate of finance sector dummy variable for western China was 1.983 at the 5% significance level.

First, this part investigates quantitative differences among economic sector standard labor earnings, which are the main source for between-group inequality across economic sectors. The reason that differences among standard labor earnings are not the whole reason for between-group inequality is the different subpopulation characteristics across economic sectors. For the whole China, in 2010, the coefficients of other occupations sector dummy variable, real estate sector dummy variable, mining sector dummy variable, accommodation and catering sector dummy variable, and construction sector dummy variable had the five highest estimates of 5.353, 5.140, 5.074, 5.060, and 4.994 separately. Then, in 2010, individual labor earnings would increase by 535.3%, 514.0%, 507.4%, 506.0%, and 499.4% respectively if corresponding economic sector dummy variable jumped from 0 to 1, while values of all other demographic variables, which resulted in part of the within-group inequalities across economic sectors, did not change. Meanwhile, the coefficients of public administration and social organization sector dummy variable; agriculture, forestry, livestock, and fishery sector dummy variable;

health, social insurance, and social welfare sector dummy variable; education sector dummy variable; production and distribution of electricity, gas, and water sector dummy variable had the five lowest estimates of 4.368, 4.498, 4.660, 4.642, and 4.707 separately. Then labor earnings would increase by 436.8%, 449.8%, 466.0%, 464.2%, and 470.7% respectively for corresponding economic sector dummy variable jumping from 0 to 1. For instance, standard labor earnings of an individual working in the real estate sector were higher than an individual working in the public administration and social organization sector by 14.382% in 2010.

For northern China, in 2010, the coefficients of other occupations sector dummy variable, and leasing and business service sector dummy variable had the two highest estimates of 7.368 and 6.783 respectively, while the coefficients of household service and other service sector dummy variable, and public administration and social organization sector dummy variable had the two smallest estimates of 6.244 and 6.410. As to eastern China, the coefficients of transport, storage, and postal service sector dummy variable and real estate sector dummy variable had the two highest estimates of 4.482 and 4.442 respectively, while the coefficients of agriculture, forestry, livestock, and fishery sector dummy variable and R&D, technical service, and geologic prospecting sector dummy variable had the two smallest estimates of 2.208 and 3.192. For western China, coefficients of entertainment, culture, and sports sector dummy variable and production and management of water conservancy, environment, and public facilities sector dummy variable had the two highest estimates of 5.372 and 5.322 respectively, while the coefficients of other occupations sector dummy variable and agriculture, forestry,

livestock, and fishery sector dummy variable had the two smallest estimates of 3.052 and 3.646. At last, in central China, the coefficients of other occupations sector dummy variable and mining sector dummy variable had the two highest estimates of 6.224 and 6.037 respectively, while the coefficients of public administration and social organization sector dummy variable and leasing and business service sector dummy variable had the two smallest estimates of 5.002 and 5.072.

For the whole China, in 2012, coefficients of entertainment, culture, and sports sector dummy variable; transport, storage, and postal service sector dummy variable; mining sector dummy variable; manufacturing sector dummy variable; and household service and other service sector dummy variable had the five highest estimates of 5.068, 5.057, 4.954, 4.947, and 4.888 separately. Thus, individual labor earnings would increase by 506.8%, 505.7%, 495.4%, 494.7%, and 488.8% respectively for the corresponding economic sector dummy variable jumping from 0 to 1. Further, coefficients of agriculture, forestry, livestock, and fishery sector dummy variable; public administration and social organization sector dummy variable; management of water conservancy, environment, and public facilities sector dummy variable; education sector dummy variable; and health, social insurance, and social welfare sector dummy variable had the five lowest estimates of 4.118, 4.333, 4.420, 4.486, and 4.601 separately. Then individual labor earnings would increase by 411.8%, 433.3%, 442.0%, 448.6%, and 460.1% respectively for one economic sector dummy variable jumping from 0 to 1 with values of demographic factors unchanged. Similarly, coefficient estimates of economic sector dummy variables measure quantitatively the differences among economic sector standard

labor earnings. For example, standard labor earnings of an individual working in the entertainment, culture, and sports sector were higher than that of an agricultural worker by 18.562% in 2012.

For northern China, the coefficients of other occupations sector dummy variable and finance sector dummy variable had the two highest estimates of 7.482 and 7.371 respectively, while the coefficients of agriculture, forestry, livestock, and fishery sector dummy variable and management of water conservancy, environment, and public facilities sector dummy variable had the two smallest estimates of 6.066, and 6.444. As to eastern China, the coefficients of other occupations sector dummy variable and finance sector dummy variable had the two highest estimates of 7.236 and 7.017 respectively as well, while the coefficients of agriculture, forestry, livestock, and fishery sector dummy variable and management of water conservancy, environment, and public facilities sector dummy variable had the two smallest estimates of 5.838 and 6.227. For western China, the coefficients of management of water conservancy, environment, and public facilities sector dummy variable and other occupations sector dummy variable had the two highest estimates of 4.967 and 4.307 respectively, while the coefficients of finance sector dummy variable and communication, computer engineering, and software service sector dummy variable had the two smallest estimates of 1.983 and 2.369. At last, in central China, the coefficients of mining sector dummy variable and transport, storage, and postal service sector dummy variable had the two highest estimates of 3.872 and 3.837 respectively, while the coefficients of public administration and social organization sector dummy

variable, and other occupations sector dummy variable had the two smallest estimates of 2.096 and 2.565.

In general, in 2010, workers of secondary industry and service industry with large added economic value earned higher average labor earnings, while workers of agriculture, forestry, livestock, and fishery sector; high technology industry; and service industry with small added economic value, such as education sector and health, social insurance, and social welfare sector, earned relatively lower labor earnings. Further, more service industry workers started to obtain higher labor earnings in 2012. Specifically, standard labor earnings of economic sectors below were averagely higher than others for the two years: manufacturing sector; construction sector; mining sector; transport, storage, and postal service sector; real estate sector; accommodation and catering sector; finance sector; and other occupations sector.

At the same time, coefficient estimates of economic sector dummy variables indicate the growth of standard labor earnings of each economic sector with demographic factors controlled. From 2010 to 2012, laborers of entertainment, culture, and sports sector; transport, storage, and postal service sector; household service and other service sector; finance sector; and manufacturing sector experienced the five largest labor earnings growth by 4.351%, 1.987%, 1.833%, 0.479%, and 0.371% respectively. Meanwhile, laborers of management of water conservancy, environment, and public facilities sector; other occupations sector; agriculture, forestry, livestock, and fishery sector; real estate sector; and accommodation and catering sector went through the five largest standard

labor earnings declines by -8.430%, -7.792%, -6.912%, -5.407%, and -3.036% respectively.

For northern China, standard labor earnings of health, social insurance, and social welfare sector and household service and other service sector had the two highest rises by 10.020%, and 9.498% respectively, while the standard labor earnings of real estate sector and communication, computer engineering, and software service sector underwent the two largest declines by -1.383% and -1.199% from 2010 to 2012. As to eastern China, laborers of all economic sectors enjoyed considerable growth in standard labor earnings. Among them, standard labor earnings of agriculture, forestry, livestock, and fishery sector and R&D, technical service, and geologic prospecting sector experienced the two largest increments by 113.155% and 83.969% respectively, while the standard labor earnings of real estate sector and accommodation and catering sector had the two smallest increases by 39.122%, and 43.998%. While standard labor earnings across economic sectors in eastern China were booming from 2010 to 2012, standard labor earnings across economic sectors in western China and central China were declining in fact. Foe these two regions, there was only one economic sector -- the other occupations sector in western China having a positive change. Standard labor earnings of management of water conservancy, environment, and public facilities sector and real estate sector had the two slightest declines by -5.615% and -12.475% respectively, while standard labor earnings of finance sector and mining sector went through the two worst decreases by -47.007% and -41.408%. At last, in central China, standard labor earnings of transport, storage, and postal service sector and entertainment, culture, and sports sector had the two slightest

declines by -25.378% and -27.092% respectively, while standard labor earnings of other occupations sector and public administration and social organization sector had the two largest decreases by -50.651% and -48.417%.

To sum up, for the whole China, standard labor earnings of transport, storage, and postal service sector; manufacturing sector; and finance sector were high averagely among sectors between 2010 and 2012 and experienced positive relative growth at the same time. On the other side, for some economic sectors, where employers already offered average good returns, they actually had decline in labor earnings, such as construction sector; mining sector; real estate business sector; and accommodation and catering service sector. Further, for most economic sectors with average low standard labor earnings between 2010 and 2012, standard labor earnings underwent slight relative decreases by less than 2%, such as public administration and social organization sector; health, social insurance, and social welfare sector; production and distribution of electricity, gas, and water sector; R&D, technical service, and geologic prospecting sector; leasing and business service sector; and communication, computer engineering, and software service sector. At last, although standard labor earnings of agriculture, forestry, livestock, and fishery sector; household service and other service sector; entertainment, culture, and sports sector; and education sector were relative low averagely for the two year period; standard labor earnings of agriculture, forestry, livestock, and fishery sector; and education sector went through severe declines, while changes in standard labor earnings of household service and other service sector and entertainment, culture, and sports sector were positive.

5.1.4. Individual labor earnings inequality

Theil's T statistic has the property of linear decomposability. Table 12 illustrates the within-group inequalities of economic sectors and between-group inequality across economic sectors. As we can see, between-group inequality accounted for around 6% of the national labor earnings Theil's T index in 2010, and around 5% of the national labor earnings Theil's T index in 2012. Coefficient estimates of economic sector dummy variables from cross-section data regressions indicate more accurate measurements of labor earnings levels of economic sectors, which are main source of between-group inequality. Further, labor earnings shares weighted average of within-group inequalities explained 94% and 95% of the national labor earnings Theil's T index in 2010 and in 2012 respectively. Thus, within-group inequalities were important, and more attentions should be paid to individual characteristics, such as education, ability, and age, geographic factors, and any other factors attributing to within-group inequality.

For demographic regressors of 2010, as shown in table 10, the impacts of gender, age, IQ level, and word test performance were positive and significant for national level regression and all regional level regressions. Most of the coefficient estimates of these four regressors can be believed to be at the 1% significance level, and only coefficient estimates of IQ and word test performance for northern China were at the 5% significance level. In 2010, male workers earned around 50% more than female workers with other demographic factors controlled at both national level and regional levels. The

impacts of age, IQ level, and word test performance were not as consistent as the impacts of gender. For instance, while labor earnings of a worker would increase by 5.19% along with getting one year old at the national level, labor earnings of a worker would increase by 2.70% along with getting one year old in northern China. The impacts of retirement were negative and significant for national level regression and all regional level regressions. The estimates of retirement coefficients for the whole China, eastern China, western China, and central China can be believed to be at the 1% significance level, and only coefficient estimate for northern China were at the 5% significance level. As expected, if a worker had retired, then labor earnings of this worker would decrease enormously. Except northern China, labor earnings decreased by more than 150% in all regions, thus, and the whole China after a worker had retired. Most estimates of marital status dummy variable coefficients and urban dummy variable coefficients were mixed and not significant. Coefficient estimates for eastern China was the only significant one among all estimates of marital status dummy variable coefficients, and it was negative at the 5% significance level. Meanwhile, coefficient estimates for northern China was the only significant one among all estimates of urban dummy variable coefficients, and it was positive at the 10% significance level. This result may come from that agriculture, forestry, livestock, and fishery dummy variable has been included in the regression equation as a regressor. The impacts of both education years of a laborer and education years of the father of a laborer were positive. Among them, the education coefficient estimates for the whole China and eastern China, and father's education coefficient estimates for the whole China and eastern China were significant at the 1% significance

level, and both education coefficient and father's education coefficient estimates for central China were at the 5% significance level.

For 2012 demographic regressors, as shown in table 11, the impacts of gender were positive and significant for national level regression and all regional level regressions. The same as the 2010 regression, most gender coefficient estimates were around 0.5 at the 1% significance level. However, in eastern China, a male worker earned only 37.2% more than a female worker with other demographic factors controlled. The impacts of age were still positive for national level regression and all regional level regressions, but coefficient estimates were relative small comparing with 2010 ones. Especially, for eastern China, there was a huge decrease from 0.067 to 0.019. Meanwhile, for northern China, the coefficient became not significant, and decreased from 0.027 to 0.003. In 2012, the coefficient estimate of marital status dummy variable was significant at the 10% significance level for the whole China, while coefficient estimates of marital status dummy variable were positive but not significant for four regions. For retirement dummy variable, all the coefficient estimates were negative, and coefficient estimates for the whole China, eastern China, and western China were significant. However, labor earnings decreased by 63.7% only at the national level after a worker had retired, compared to more than 150% relative decreases in 2010. Further, all of coefficient estimates of education years were at the 1% significance level and values of these estimates also increased from 2010 to 2012. Labor earnings could increase by more than 10% for most regions, thus the whole China if a worker accepted one year more education. The impacts of IQ were positive and also at the 1% significance level for

national regression and regional regressions. Further, all coefficient estimates of IQ in 2012 were larger than 2010 coefficient estimates except the one for eastern China. Most coefficient estimates of the new added number series tests performance variables were positive and significant, but its coefficient estimate for northern China was negative and not significant. Additionally, impacts of urban dummy variable were mixed and not significant after economic sector dummy variables included in the regression equation. At last, impacts of the number of children were also mixed and not significant for labor earnings, except that for central China, the coefficient was -0.150 at the 10% significance level.

Therefore, according to illustrations above, within-group inequality partly came from the impacts of gender, age, IQ level, retirement status, education years, education years of father, word test performance, and number series test performance between 2010 and 20012, although there could be other demographic factors not included. Except the coefficient estimates of retirement status dummy variable, all of significant coefficient estimates of these demographic factors were positive in 2010 cross-section data regressions and 2012 cross-section data regressions. Further, the impacts of age and retirement status on labor earnings diminished from 2010 to 2012, while the impact of education years enlarged.

5.2. Panel data regression

In this part, panel data regression is utilized to identify the impact of employment in each economic sector and other demographic characteristics in 2010 and 2012. Although with panel data the relationship between observations of one laborer in two different years is taken into consideration, the number of observations becomes smaller and coefficient estimators become more sensitive to misspecification. Additionally, both fixed-effects estimators and random-effects estimators are not applied here, as the changes in impacts of regressors on labor earnings from 2010 to 2012 are investigated, that is, coefficients of same regressor are required to be different for different years, instead of being applied the common coefficient assumption to. Therefore, general multiple-equation GMM model (Hayashi, 2000) is adopted here. One equation is for 2010, and the other equation is for 2012:

$$\begin{aligned}
\boldsymbol{logy_{2010}} = {} & \beta_{1,2010}\boldsymbol{gender_{2010}} + \beta_{2,2010}\boldsymbol{age_{2010}} + \beta_{3,2010}\boldsymbol{marry_{2010}} \\
& + \beta_{4,2010}\boldsymbol{retire_{2010}} + \boldsymbol{H_{2010}\gamma_{2010}} + \beta_{5,2010}\boldsymbol{eduy_{2010}} + \beta_{6,2010}\boldsymbol{IQ} \\
& + \beta_{7,2010}\boldsymbol{father\ eduy} + \beta_{8,2010}\boldsymbol{series\ test} + \boldsymbol{\varepsilon_{2010}} \\
\boldsymbol{logy_{2012}} = {} & \beta_{1,2012}\boldsymbol{gender_{2012}} + \beta_{2,2012}\boldsymbol{age_{2012}} + \beta_{3,2012}\boldsymbol{marry_{2012}} \\
& + \beta_{4,2012}\boldsymbol{retire_{2012}} + \boldsymbol{H_{2012}\gamma_{2012}} + \beta_{5,2012}\boldsymbol{eduy_{2012}} + \beta_{6,2012}\boldsymbol{IQ} \\
& + \beta_{7,2012}\boldsymbol{father\ eduy} + \beta_{8,2012}\boldsymbol{series\ test} + \boldsymbol{\varepsilon_{2012}}
\end{aligned}$$

Data matrix $\boldsymbol{H}$ is the data matrix of economic sector dummy variables. Each row of data matrix $\boldsymbol{H}$ is $\boldsymbol{h_i}'$, and there are as many rows as the number of observations of each year. For 2010 equation, instruments are gender, age, urban dummy, marital status, retirement, learning dummy, all economic sector dummies, education, IQ, father's education, word

test performance, math test performance, number series test performance, the number of children, healthiness, desperation level, people who took care the respondent when he or she got sick, and the closest friend of the respondent. For 2012 equation, instruments are gender, age, urban dummy, marital status, retirement, learning dummy, all economic sector dummies, education, IQ, number series test performance, the number of children, workout frequency, immediate word recall test performance, delayed word recall test performance, people who took care the respondent when he or she got sick, and depression level. The orthogonal conditions for two equations have been verified by using J statistics and C statistics. To satisfy rank condition for identification, in 2010 equation, management of water conservancy, environment, and public facilities sector dummy variable as a regressor is omitted; and in 2012 equation, other occupations sector dummy variable as a regerssor is omitted. Further, multiple-equation GMM estimators are robust and efficient.

With robust and efficient multiple-equation GMM estimates, let us start to investigate impacts of employment in each economic sector. As we can see, all of coefficient estimates of economic sector dummy variables were at the 1% significance level in both 2010 and 2012. In 2010, coefficients of R&D, technical service, and geologic prospecting sector; finance sector; agriculture, forestry, livestock, and fishery sector; entertainment, culture, and sports sector; and transport, storage, and postal service sector had the five largest estimates at 8.873, 8.644, 8.620, 8.521, and 8.440. Meanwhile, coefficients of other occupations sector; household service and other service sector; leasing and business service sector; wholesale and retail trade sector; and public administration and social

organization sector had the five smallest estimates at 7.892, 8.076, 8.122, 8.139, and 8.155 respectively. In 2012, coefficients of mining sector; finance sector; R&D, technical service, and geologic prospecting sector; entertainment, culture, and sports sector; and household service and other service sector had the five largest estimates at 9.005, 8.947, 8.894, 8.877, and 8.847. At the same time, coefficients of management of water conservancy, environment, and public facilities sector; public administration and social organization sector; agriculture, forestry, livestock, and fishery sector; real estate sector; and health, social insurance, and social welfare sector had the five smallest estimates at 7.480, 8.378, 8.412, 8.448, and 8.487 respectively. Further, as mentioned above, quantitative differences among labor earnings levels of economic sectors are the main source of between-group inequality. For instance, labor earnings of an individual working for R&D, technical service, and geologic prospecting sector were higher than an individual who had same individual characteristics and worked for household service and other service sector, by 8.781% in 2010. Likewise, labor earnings of an individual working for mining sector were higher than an individual who had same individual characteristics and worked for management of water conservancy, environment, and public facilities sector, by 17.983% in 2012.

After examining the main source of between-group inequality across economic sectors, economic sector labor earnings growth was measured by the difference between the coefficient estimate of a economic sector dummy variable in 2010 and the coefficient estimate of the same economic sector dummy variable in 2012. Except omitted dummy variable for management of water conservancy, environment, and public facilities sector

and sector of other occupations, only coefficient estimates of dummy variable for agriculture, forestry, livestock, and fishery sector became smaller from 2010 to 2012, which led to an decrease in agricultural labor earnings by -2.162%. Further, five economic sectors with smallest increases in labor earnings were R&D, technical service, and geologic prospecting sector; real estate sector; transport, storage, and postal service sector; public administration and social organization sector; and health, social insurance, and social welfare sector. Labor earnings of these sectors grew by 0.213%, 0.340%, 2.002%, 2.436%, and 2.862% respectively. Meanwhile, labor in household service and other service sector; mining sector; leasing and business service sector; accommodation and catering service sector; and wholesale and retail trade sector had the five largest labor earnings increases by 8.495%, 6.300%, 5.887%, 5.614%, and 4.716% respectively.

To sum up, economic sectors with higher economic value added provided laborers with good labor returns according to results of multiple-equation GMM regression, while laborers in low-skill service sectors faced persistent low labor returns. Averagely, labor earnings of R&D, technical service, and geologic prospecting sector, finance sector, entertainment, culture, and sports sector, and mining sector kept high for both years. Among these four economic sectors, mining sector labor earnings had sharp growth by 6.300%, and earnings of labor in R&D, technical service, and geologic prospecting sector, finance sector, and entertainment, culture, and sports sector experienced moderate growth. Meanwhile, labor earnings in wholesale and retail trade sector, public administration and social organization sector, and health, social insurance, and social welfare sector were relatively low between 2010 and 2012. Among these three economic

sectors, labor earnings in public administration and social organization sector, and health, social insurance, and social welfare sector went through slow standard labor earnings growth by 2.436% and 2.862% from 2010 to 2012. At the same time, wholesale and retail trade sector experienced satisfying growth by 4.716% as a result of e-commerce prosperity. Further, labor earnings in household service and other service sector, accommodation and catering service sector, and communication, computer engineering, and software service sector had impressive growth as relatively low labor earnings levels in 2010 and relatively high labor earnings levels in 2012. On the other hand, labor earnings of agriculture, forestry, livestock, and fishery sector, real estate sector, and transport, storage, and postal service sector had gentle growth as relatively high labor earnings levels in 2010 and relatively low labor earnings levels in 2012. Thus, high demand for products and service drove incredible growth in labor earnings in some economic sectors, while relatively slow growth occurred in stagnant economic sectors or economic sectors providing high labor returns already. Additionally, significant rises in labor earnings in feeling good service sectors imply that the marginal propensity to consume was becoming higher in china from 2010 to 2012.

At last, demographic regressors partly explained labor earnings within-group inequality in 2010 and in 2012. The coefficient estimates of gender were positive for two years with values around 0.35 at the 1% significance level. Hence, labor earnings of a male laborer were averagely higher than labor earnings of a female laborer with similar characteristics by around 35% in China. The coefficient estimates of age were also positive in both 2010 and 2012, but only the coefficient estimate of age in 2010 was significant at the 5%

significance level. Meanwhile, the impacts of marital status dummy variable and retirement dummy variable were mixed and not significant for two periods. Further, coefficient estimates of education years were positive for both years. Thus, one more year education could bring a laborer an increase in labor earnings by 6.2% in 2010 and a smaller increase by 4.4% in 2012. However, while coefficient estimate of education years was at the 1% significance level in 2010, the coefficient estimate was only at the 10% significance level in 2012. Impacts of IQ were mixed for two periods as well. Additionally, only the 2010 coefficient estimate was significant at the 5% significance level, and it was positive. Coefficient estimates of father's education years and number series tests performance were all positive. Only coefficient estimate of number series tests performance was significant at the 10% level in 2010.

6. Labor earnings mobility

After examining the growth and inequality of labor earnings, impacts of economic sectors labor working for and demographic factors on labor earnings. In this section, the growth and inequality of labor earnings will be explored from a perspective of labor earnings quantiles with cross-section data firstly. Then, individual labor earnings growth is a focus of this section. Panel data are utilized to describe the generality of individual labor earnings growth and discuss how economic sectors labor working for and demographic factors contributed to individual labor earnings growth in the micro mobility regression model. Particularly, 2010 labor earnings are added into the micro mobility regression

model as a regressor, since previous labor earnings are related to other sources, apart from demographic factors mentioned in section 5, of within-group labor earnings inequality across economic sectors.

6.1. Labor earnings subgroups by quantiles

Changes in Chinese labor earnings during two years are studied for each quantile subgroup. Statistics calculated based on normal labor earnings distributions are discussed first. For the 3rd, the 5th, the 6th, the 7th, the 8th, and the 9th labor earnings subgroups, laborers earned more in 2012 than laborers in the same quantile subgroup in 2010 averagely. Further, for the 3rd, the 5th, the 6th, the 7th, and the 9th labor earnings subgroups, quantile subgroup shares of labor earnings in 2012 were larger than shares in 2010. Thus, we can conclude that the middle class was rising. Meanwhile, for the 2nd quantile subgroup, a slight decline in wage mean occurred by 6.65% only, while there was a severe decline in labor earnings for the first quantile subgroup by 44.48%. These numbers may state that poor laborers became poorer in the poverty trap during the two years, which are consistent with findings in section 3. Nevertheless, it is possible that the China Family Panel Studies (CFPS) improved their survey process, so that the household datasets became more representative, and more low labor earnings observations were included in the datasets. As to the richest 10 percent laborers, there was a 5.05% downturn in labor earnings mean; however, quantile subgroup share of labor earnings decreased by 14.49% as a result of relative high individual labor earnings. Then, I investigate quantile subgroup labor earnings from the standpoint of inequality with the

Theil's T index. All the Theil's T indexes have been normalized to make indexes of different quantile subgroups comparable. Normalized Theil's T indexes range from 0 to 1. In detail, normalized Theil's T indexes, calculated from both the national labor earnings distribution and quantile subgroup labor earnings distributions, were higher in 2012 than those in 2010. For the poorest six subgroups, all of Theil's T indexes increased by more than or equal to 100%. For the 7th, the 8th, and the 9th quantile subgroups, their Theil's T indexes relatively increased by more than 50% over the two years. As the Theil's T index of the richest subgroup had a relatively unobvious increase of 28.57%, and the between-group inequality across quantile subgroups decreased from 0.96% in 2010 to 0.84% in 2012 by 12.27%. Hence, national labor earnings inequality had a reasonable increase by 13.61%.

Then, statistics calculated based on real labor earnings distributions are discussed. For the three poorer labor earnings quantile subgroups, in 2012 labor earnings means of these subgroups became smaller, while for the seven richer labor earnings quantile subgroups, in 2012 labor earnings means were larger than means in 2010. For the 3nd quantile subgroup, the decline of labor earnings mean was slight by only 5.08%, while declines in labor earnings means of the poorest quantile subgroup and the second poorest quantile subgroup were more severe by 49.53% and 17.18% respectively. On the other side, laborers of the 8th and the 9th quantile subgroups were enjoying the largest increases in average labor earnings by 10.68% and 9.42% respectively. As to the richest 10 percent laborers, there was a mild labor earnings means increase by 2.50%. Further, from the 4th quantile subgroup to the 9th quantile subgroup, all of subgroup labor earnings shares

increased over the two years. The richest quantile subgroup share in labor earnings experienced a small turndown by -0.35%, and this small turndown is consistent with the relative slow growth in average labor earnings compared to that of Chinese laborers as a whole. Additionally, for the three poorest quantile subgroups, labor earnings shares underwent declines by -50.94%, -19.48%, and -7.72% respectively. Thus, we can conclude that both middle class and rich class benefited from the overall growth. As to inequality, whether for national labor earnings distribution, or for each quantile subgroup labor earnings distribution, the normalized Theil's T index was higher in 2012 than the one in 2010. For the four poorest quantile subgroups, all of Theil's T indexes increased by more than 150%. For the 5th and the 6th quantile subgroups, their Theil's T indexes increased by more than 100%, and for the four richest quantile subgroups, their Theil's T indexes increased around 50% over the two years. As the between-group inequality decreased from 0.85% to 0.79%, total inequality had an acceptable increase of 22.56%.

In sum, according to labor earnings mean and labor earnings shares of each quantile subgroup, laborers in the middle class and the rich class shared the prosperity between 2010 and 2012. Moreover, the poorer the quantile subgroup was between 2010 and 2012, the larger the increase in Theil's T index of a quantile subgroup was, although there were increases in all of quantile subgroup within-group inequalities measured by the Theil's T index. However, labor earnings gaps among different labor earnings quantile subgroups became narrower, while all within-group inequalities become larger. These results are coherent as it matches the fact illustrated by the probability density curve that the national labor earnings observations spread out and became smoother other than concentrating

together within each quantile subgroup. Therefore, in the next part, I studied individual labor earnings growth and factors affecting individual labor earnings growth rate.

6.2. Macro mobility

Milton Friedman (1962) stated as follows. “Consider two societies that have the same distribution of annual income. In one there is great mobility and change so that the position of particular families in the income hierarchy varies widely from year to year. In the other, there is great rigidity so that each family stays in the same position year after year. Clearly, in any meaningful sense, the second would be the more unequal society.” Therefore, mobility matters for understanding the Chinese labor earnings panel data. Two concentrations are the variation of the position of an individual in the labor earnings hierarchy from 2010 to 2012, and the impacts of employment in each economic sector and demographic factors on labor earnings.

First, for the panel data labor earnings changes from 2010 to 2012, the average labor earnings changes was 5,841.537 yuan, and the standard deviation was 32,579.65 yuan. Naturally, the range of the panel data labor earnings changes was vast. Among labor earnings changes observations, the four smallest change values were -377,315.8 yuan, -252,714.3 yuan, -219,636.1 yuan, and -210,413.9 yuan. At the same time, the four largest change values were 1,614,984 yuan, 210,977.1 yuan, 193,426.2 yuan, and 189,892 yuan. Further, the skewness is 20.959, and the kurtosis is 1,086.852. Hence, the panel data

labor earnings changes distribution was peaked and positively skewed with high variance. The probability density curve of labor earnings changes distributions is shown in graph 7.

From table 16, we can learn that by initial labor earnings quintiles, panel labor earnings changes were convergent. The panel average labor earnings changes decreased strictly from 11,123.24 yuan of the poorest quintile subgroup to -845.93 yuan of the richest quintile subgroup. Then, in general, the poorer the laborer was, the larger the labor earnings change was from 2010 to 2012. Hence, for Chinese labor earnings, panel real labor earnings changes were convergent although labor earnings inequality was rising. Further, the quantile transition matrix illustrates that 70.43% laborers changed their labor earnings quintiles from 2010 to 2012. Moreover, 33.54% laborers of all moved up to higher labor earnings quintiles, while 36.89% laborers moved down to lower labor earnings quintiles. For laborers moving up, in the order from the poorest quintile subgroup to the richest quintile subgroup, the percentage of all laborers moving up decreased strictly from 46.58% to 19.62%. For laborers moving down, the fourth quintile subgroup had the highest percentage of all laborers moving down -- 43.46%. Further, the third quintile subgroup and the fifth quintile subgroup had the second highest percentage of all laborers moving down -- around 39.5%. Besides, 60.79 percent of laborers in the richest quintile subgroup, which was the largest percentage among five quintile subgroups, remained at the richest quintile subgroup, and for those moving down laborers, around 63.12 percent of them stayed at the second highest labor earnings quintile group. Further, 53.42 percent of laborers in the poorest quintile subgroup, which was the second largest percentage among five quintile subgroups, stayed at the poorest

quintile subgroup. The most common explanation for this phenomenon is the poverty trap mechanism. To sum up, Chinese labor earnings were far from both complete persistence and perfect mobility.

6.3. Conditional micro mobility

6.3.1. Model

With the generalized method of moments, in this part, I first check the relationship between real labor earnings changes from 2010 to 2012 and correspondent initial real labor earnings in 2010, and second explore the relationship between real labor earnings changes from 2010 to 2012 and employment in each economic sector in 2012. The conditional micro mobility equation is as follows:

$$log(\Delta y_i) = \alpha \widehat{logy_{i,2010}} + \boldsymbol{\beta_1}'\boldsymbol{z_i} + \boldsymbol{\beta_2}'\boldsymbol{x_{i,\,2010}} + \boldsymbol{\beta_3}'\boldsymbol{x_{i,\,2012}} + \boldsymbol{\delta_1}'\boldsymbol{h_{i,2012}} + \varepsilon_i.$$

The dependent variable is ***log(Δy)***, the natural logarithm of changes in real labor earnings in yuan from the year 2010 to the year 2012. The natural logarithm of predicted 2010 labor earnings $\widehat{\boldsymbol{logy}_{\mathbf{2010}}}$ are adopted to replace the survey data $\boldsymbol{logy_{2010}}$ on the right hand to avoid bias issue. Predicted 2010 labor earnings $\widehat{\boldsymbol{logy}_{\mathbf{2010}}}$ are obtained from the multiple-equation GMM regression in the last section. Regressor $\boldsymbol{z_i}$ denotes a vector consisting of time-invariant or almost time-invariant demographic factors of the *i*-th observation in the panel data, consisting of gender, age, education, IQ, father's education,

number series test performance, work out frequency, and the number of children. Regressor $\boldsymbol{x}_{i,\ 2010}$ and $\boldsymbol{x}_{i,\ 2012}$ denote vectors consisting of time-varying demographic factors of the *i*-th observation in the panel data. In detail, $\boldsymbol{x}_{i,\ 2010}$ is composed of dummy variable for marital status and dummy variable for retirement of the *i*-th observation in 2010, while $\boldsymbol{x}_{i,2012}$ is composed of dummy variable for marital status and dummy variable for retirement of the *i*-th observation in 2012. Further, $\boldsymbol{h}_{i,2012}$ is a vector consisting of dummy variables for economic sectors identifying where the *i*-th observation worked in 2012. Specifically, $\boldsymbol{h}_i$ is composed of twenty economic sector dummy variables from job_2 to job_21 as its elements. Then, **job_2** to **job_21** represent dummy variables for agriculture, forestry, livestock, and fishery sector; mining sector; manufacturing sector; production and distribution of electricity, gas, and water sector; construction sector; transport, storage, and postal service; communication, computer engineering, and software sector; wholesale and retail trade sector; accommodation and catering sector; finance sector; real estate sector; leasing and business service; R&D, technical service, and geologic prospecting sector; management of water conservancy, environment, and public facilities sector; household service and other service sector; education sector; health, social security, and social welfare sector; entertainment, culture, and sports sector; public administration and social organization sector; and other occupations sector respectively. Before GMM regression results are utilized for conditional micro mobility study, the J statistic and C statistic based on the efficient two-step GMM are applied to test whether all the instruments are predetermined. Predetermined instruments that are not regressors but used for testing overidentifying restrictions, are healthiness, people who took care the respondent when he or she got sick in 2010 and in 2012, the closest friend

of the respondent, and depression level. Moreover, regression estimators are efficient and robust.

6.3.2. Impacts

Firstly, the coefficient α was positive at the 5% significance level, then the larger the predicted labor earnings were in 2010, the larger the changes in labor earnings were from 2010 to 2012. That is, laborers with the highest predicted earnings in 2010 experienced the largest positive changes in dollars after controlling demographic factors, and the economic sector where laborers worked in 2012. The estimate of coefficient α was 0.253, and it indicates that predicted labor earnings in 2010 increased by 10%, then labor earnings changes increased by 2.53%. Moreover, for time-invariant variables $\boldsymbol{z_i}$, only coefficients of education years, IQ score, and number series test performance were significantly different from zero; thus, these factors played a role in explaining labor earnings changes. In detail, coefficient estimates of these three time-invariant variables were positive. The coefficient of education years were at the 10% significance level, while coefficients of IQ score and number series test performance were at the 1% significance level. Further, all coefficients of four time-varying regressors were not statistically significant. For economic sector dummy variables, except the omitted dummy variable for sector of other occupations, all coefficients of them were different from zero at the 1% significance level. Five largest coefficient estimates of economic sector dummy variables were 5.810, 5.796, 5.179, 5.177, and 5.113 for agriculture, forestry, livestock, and fishery sector; finance sector; transport, storage, and postal

service sector; real estate sector; and communication, computer engineering, and software service sector respectively. Five smallest coefficient estimates of economic sector dummy variables were 4.022, 4.417, 4.469, 4.477, and 4.586 for management of water conservancy, environment, and public facilities sector; leasing and business service sector; production and distribution of electricity, gas, and water sector; public administration and social organization sector; and education sector respectively. Coefficient estimates of economic sector dummy variables reflect real labor earnings changes for laborers working for each economic sector in 2012, after controlling demographic factors and 2010 predicted labor earnings. For instance, if laborers worked in the agriculture forestry, livestock, and fishery sector in 2012, their labor earnings changes will larger than those of laborers, who had same individual characteristics and 2010 predicted labor earnings, working in the management of water conservancy, environment, and public facilities sector by 35.60%.

To sum up, there was a relatively narrow chance to achieve large increments in labor earnings for laborers starting with overall disadvantaged demographic factors and staying in economics sectors with low labor earnings levels in 2010. Besides, education and ability were crucial for improving personal labor earnings, while gender, age, household characteristics, work out frequency, and retirement status did not make a difference in labor earnings changes. On the other hand, laborers experienced a growth in labor earnings generally if laborers were in economic sectors with higher economic value added, such as construction sector; real estate sector; and entertainment, culture, and sports sector in 2012. Further, laborers improved labor earnings averagely if laborers

were in services high technology and intensive knowledge in 2012, such as fiancé sector; communication, computer engineering, and software service sector; and R&D, technical service, and geologic prospecting sector. Additionally, laborers had high labor earnings increments if laborers were in economic sector providing high demand products and service, such as transport, warehouse, and postal service sector; agriculture, forestry, livestock, and fishery sector; and accommodation and catering sector in 2012.

7. Conclusion

This paper starts from, according to labor earnings sources, dividing labor into three groups: employees, self-employed agricultural workers, self-employed non-agriculture individuals. Then, 21.50% people in 2010 and 20.36% people in 2012 who were under employment and worked as employees primarily become the objects of this paper. First, general growth and inequality of Chinese labor earnings distributions are discussed. There was growth in both normal labor earnings mean and real labor earnings mean. In detail, the poorest 20 percent workers gained 29.79% fewer labor earnings in 2012 than labor earnings in 2010, while the richest 20 percent workers gained 4.86% more labor earnings in 2012 than labor earnings in 2010. Further, labor earnings shares of the richest group and the poorest group in 2010 and 2012 indicate that labor earnings share of the middle class significantly increased during these two years. Meanwhile, the Lorenz-consistent inequality measurements for labor earnings inequality are calculated. Measurements indicate that overall, the Lorenz-consistent labor earnings inequality in

2012 was higher than that in 2010. For instance, Gini coefficients for real labor earnings were 0.37 and 0.40 in 2010 and 2012 respectively. If the Kuznets curve hypothesis is assumed to be true, then according to the inverted U shape of Kuznets curve, it can be acquired that the growth and inequality of Chinese labor earnings has not reached the turning point yet between 2010 and 2012.

Secondly, this paper investigates quantitatively how economic sectors characteristics contributed to overall labor earnings growth and inequality between 2010 and 2012. In conclusion, three groups of economic sectors were offering relatively high labor earnings between 2010 and 2012. They were high-tech economic sectors, knowledge-intensive economic sectors, and capital-intensive economic sectors. While these economic sectors kept high-level average labor earnings during these two years, average labor earnings growth can be another story. In general, primary and secondary industries were developing stably, while traditional service industry were going through a difficult time. Further, national labor earnings changes in economic sectors should be combined with sector population shares to determine impacts of economic sectors labor earnings growth on national labor earnings growth. Therefore, to promote overall labor earnings growth, first, high population density economic sectors should be developed, such as manufacturing sector, and wholesale and retail trade sector. Second, low labor earnings economic sectors should be upgraded with more inputs due to the high marginal outputs at the beginning, such as agriculture, forestry, livestock, and fishery sector and accommodation and catering service sector. Moreover, laborers should be encouraged to enhance their skills to transfer to rising sectors.

From the standpoint of labor earnings inequality, in general, economic sectors with temporary and informal laborers and unskilled laborers suffered higher inequality. Meanwhile, laborers in high-tech economic sectors and knowledge-intensive economic sectors experienced high growth in labor earnings inequality between 2010 and 2010. Specifically, labor earnings changes in health, social insurance, and social welfare sector; construction sector; communication, computer engineering, and software service sector; manufacturing sector; and public administration and social organization sector had the five largest contributions to the increase in national labor earnings inequality. Meanwhile, labor earnings changes in wholesale and retail trade sector; transport, storage, and postal service sector; other occupations sector; education sector; and entertainment, culture, and sports sector had the five largest offsets against the national labor earnings inequality increase.

Further, the impacts of employment in economic sectors and the sources of within-group inequalities across economic sectors between 2010 and 2012 are obtained with the help of both cross-section data regressions and panel data regression. Through cross-section data regressions, for the whole China, labor earnings levels of transport, storage, and postal service sector; manufacturing sector; and finance sector were relatively high among sectors between 2010 and 2012 and experienced increments at the same time. On the other side, for some economic sectors, where employers already offered average good returns, they were actually in labor earnings decline. Further, for most economic sectors with low labor earnings levels between 2010 and 2012, labor earnings underwent

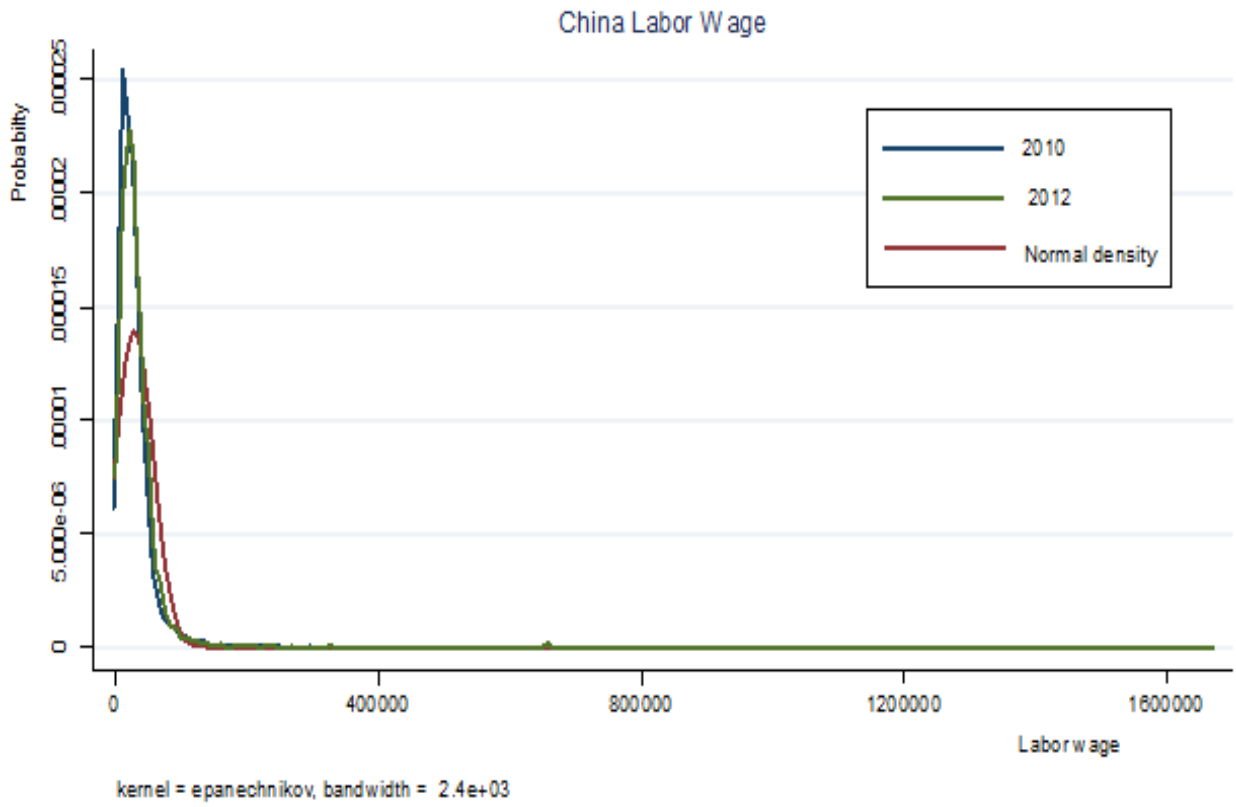
relatively slight decreases by less than 2%. Through panel data regression, employers in economic sectors with higher economic value added provided laborers with good labor returns, while laborers in low-skill service sectors faced continuous low labor returns. Besides, high demand for products and service drove incredible growth in labor earnings in some economic sectors, while relatively slow growth occurred in stagnant economic sectors or economic sectors with high labor returns already. Additionally, the significant rise in labor earnings levels of feeling good service sectors imply that the marginal propensity to consume was becoming higher in china from 2010 to 2012. From the perspective of individual development, within-group inequality partly came from individual differences in gender, age, IQ level, retirement status, education years, education years of father, word test performance, and number series tests performance, although there could be other significant demographic factors not included. Except the coefficient estimates of retirement status dummy variable, all of significant coefficient estimates of these demographic factors were positive in 2010 cross-section data regressions and 2012 cross-section data regressions. Further, the impacts of age and retirement status on labor earnings diminished from 2010 to 2012, while the impact of education years enlarged.

Through mobility analysis, we can conclude that from 2010 to 2012, convergent panel real wage changes coexisted with rising inequality, and Chinese labor earnings were far from both complete persistence and perfect mobility. Further, conditional micro mobility study displays that there was a relatively narrow chance to achieve large increments in labor earnings for laborers starting with overall disadvantaged demographic factors and

staying in economics sectors with low labor earnings levels in 2010. Besides, education and ability were crucial for workers to improve individual labor earnings. On the other hand, laborers experienced growth in labor earnings generally if laborers were in economic sectors with higher economic value added, high-technology service sectors, knowledge-intensive service sector, and economic sector providing high-demand products and service.

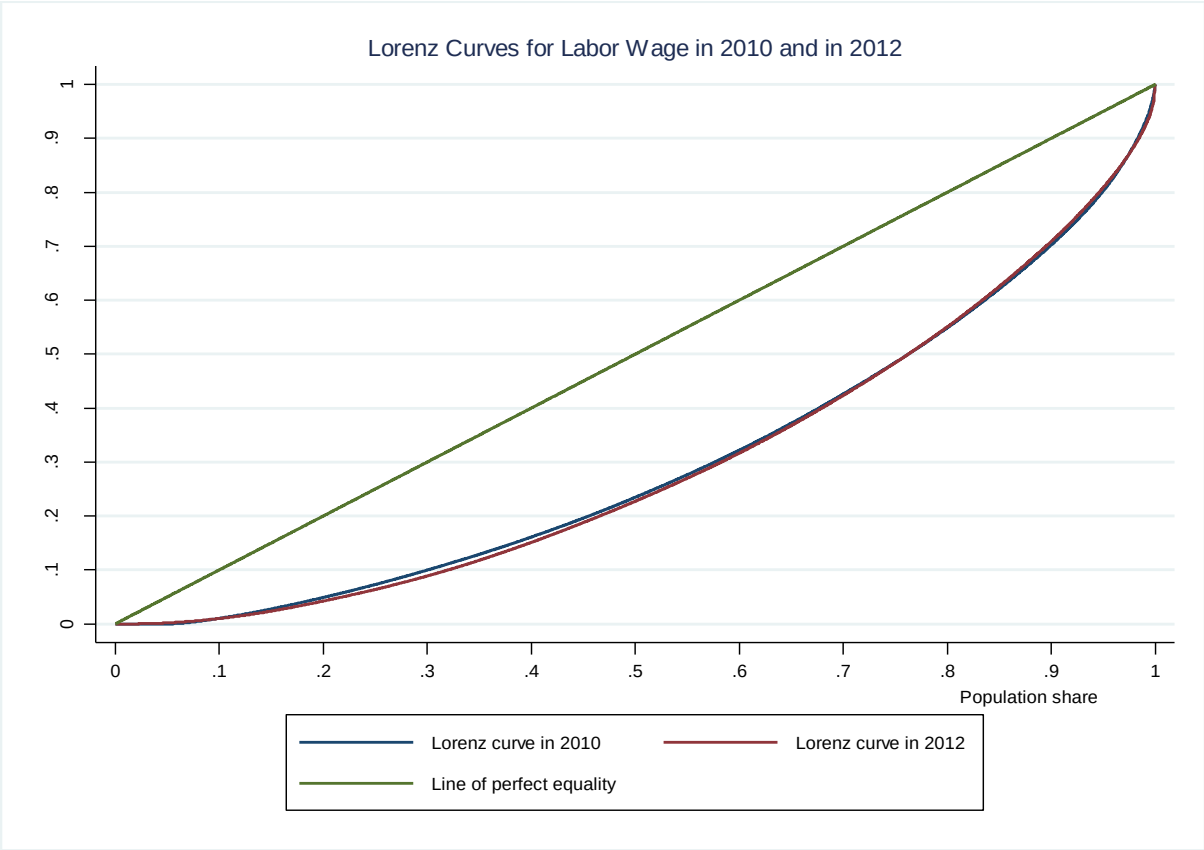
Comparing to overall income inequality before redistribution, labor earnings inequality was relative low as incomes from other sources have not been included. Also, income sharing within families and communities (Fields & Kanbur, 2007), and income sharing among generations can lead to differences in distributions of income, thus, growth, inequality, and mobility. Consumption is always a good indicator of the real living standard of a person, provided that it can be accurately measured (Fields, 2001). Thus, per capita household consumption and adult equivalent consumption can be better choices for growth, poverty, and inequality inspections.

Graph1:



Note: The data used are from China Family Panel Studies (CFPS).

Graph2:



Note: The data used are from China Family Panel Studies (CFPS).

Table 1: Real labor earnings comparison

Inequality measure		2010	2012
Real labor earnings mean (yuan)	All observations	31,276.17	32170.32
	The poorest 20 percent	10,837.19	7608.28
	The richest 20 percent	68,275.88	71595.05
Strongly-Lorenz-consistent inequality measure	Gini coefficient	0.37	0.40
	Theil's T index	0.26	0.31
	Coefficient of variation	0.91	1.13
Weakly-Lorenz-consistent inequality measure	Labor earnings share of the poorest 20%	6.93%	4.73%
	Labor earnings share of the richest 20%	43.66%	44.51%
	Relative mean deviation	51.76%	55.58%

Note: 1. Zero labor wages are not included.
2. The data used are from China Family Panel Studies (CFPS).

Table 2: 2010 labor earnings description

Economic sector	Population share	Population share (zero wage)	Average earnings
Manufacturing	30.188%	33.513%	20699.37
Public administration and social organization	9.712%	3.799%	22537.04
Wholesale and retail trade	8.809%	15.197%	21545.93
Education	7.734%	7.061%	26867.94
Transport, storage, and postal service	7.685%	7.578%	25759.04
Household service and other service	5.832%	2.395%	18016.25
Construction	4.849%	3.379%	24499.63
Accommodation and catering	4.726%	6.335%	19231.96
Mining	4.571%	0.841%	23661.62
Health, social insurance, and social welfare	4.066%	9.001%	19925.82
Production and distribution of electricity, gas, and water	2.600%	0.553%	23053.21
Finance	2.154%	2.246%	40031.85
Invalid answers	1.941%	1.302%	19816.32
Entertainment, culture, and sports	1.277%	0.574%	37928.73
Other	1.026%	5.299%	29009.54
Agriculture, forestry, livestock, and fishery	0.989%	0.000%	13542.77
Real estate	0.632%	0.823%	28267.68
Communication, computer engineering, and software service	0.546%	0.000%	28081.21
Leasing and business service	0.333%	0.104%	40402.93
R&D, technical service, and geologic prospecting	0.224%	0.000%	39107.80
Management of water conservancy, environment, and public facilities	0.105%	0.000%	50248.54

Note: 1. Zero labor wages are included.
2. The data used are from China Family Panel Studies (CFPS).

Table 3: 2012 labor earnings description

Economic sector	Population share	Population share (zero wage)	Average earning
Manufacturing	32.405%	26.893%	25242.18
Construction	12.418%	1.613%	24186.84
Wholesale and retail trade	10.002%	32.019%	22259.94
Public administration and social organization	5.954%	0.000%	29582.23
Transport, storage, and postal service	5.189%	4.196%	30687.62
Education	5.052%	0.317%	30909.06
Agriculture, forestry, livestock, and fishery	4.476%	11.238%	14319.63
Accommodation and catering service	3.712%	16.837%	18826.01
Mining	2.542%	0.000%	30696.06
Household service and other service	2.261%	1.036%	19991.38
Other	2.196%	0.755%	23782.09
Health, social insurance, and social welfare	2.148%	1.948%	35065.06
Finance	2.055%	0.000%	49137.06
Invalid answers	1.689%	2.490%	25083.81
Leasing and business service	1.564%	0.000%	30479.80
Real estate	1.501%	0.074%	25574.63
Production and distribution of electricity, gas, and water	1.400%	0.000%	26708.18
Communication, computer engineering, and software service	1.036%	0.000%	52127.16
Entertainment, culture, and sports	1.026%	0.584%	36666.45
Management of water conservancy, environment, and public facilities	0.824%	0.000%	17935.74
R&D, technical service, and geologic prospecting	0.549%	0.000%	42261.74

Note: 1. Zero labor wages are included.
2. The data used are from China Family Panel Studies (CFPS).

Table 4: Normal labor earnings by economic sectors

	2010			2012		
Economic sector	Mean earning	Labor earnings share	Theil's T index	Mean earning	Labor earnings share	Theil's T index
Agriculture, forestry, livestock, and fishery	13542.77	0.59%	1.21%	14903.83	2.45%	4.40%
Mining	23897.47	4.74%	1.00%	30696.06	2.98%	1.26%
Manufacturing	21978.03	27.42%	1.37%	25577.27	31.29%	1.32%
Production and distribution of electricity, gas, and water	23312.06	2.63%	1.35%	26708.18	1.43%	1.09%
Construction	25407.18	5.20%	1.36%	24235.42	11.48%	2.26%
Transport, storage, and postal service	27150.43	8.68%	1.70%	31092.19	6.09%	1.20%
Communication, computer engineering, and software service	28081.21	0.67%	3.28%	52127.16	2.07%	3.75%
Wholesale and retail trade	23661.53	8.33%	2.63%	23438.45	8.53%	1.86%
Accommodation and catering	20675.67	3.99%	1.88%	20336.99	2.69%	1.85%
Finance	42386.53	3.79%	2.20%	49137.06	3.86%	2.14%
Real estate	30378.22	0.79%	1.70%	25593.90	1.47%	1.87%
Leasing and business service	41050.36	0.59%	2.73%	30479.80	1.82%	1.62%
R&D, technical service, and geologic prospecting	39107.80	0.38%	0.71%	42261.74	0.89%	1.36%
Management of water conservancy, environment, and public facilities	50248.54	0.23%	1.12%	17935.74	0.57%	2.09%
Household service and other service	18406.69	4.60%	2.05%	20142.57	1.73%	1.90%
Education	28197.64	9.11%	0.97%	30938.92	5.97%	1.57%
Health, social insurance, and social welfare	22498.47	3.56%	1.39%	35554.84	2.88%	5.05%
Entertainment, culture, and sports	38813.41	2.12%	2.32%	37005.11	1.44%	2.32%
Public administration and social organization	23011.00	9.59%	1.37%	29582.23	6.73%	2.06%
Other	39304.02	1.30%	2.75%	23931.02	2.00%	1.73%
Invalid answers	20658.29	1.44%	1.70%	25815.47	1.63%	0.92%
Total	24130.36	100%	1.47%	26796.73	100%	1.67%

Note: 1. Zero labor wages are not included.
2. The data used are from China Family Panel Studies (CFPS).

Table 5: Real labor earnings by economic sectors

	2010			2012		
Economic sector	Real mean earning	Labor earnings share	Theil's T index	Real mean earning	Labor earnings share	Theil's T index
Agriculture, forestry, livestock, and fishery	18000.79	0.60%	0.0121	18634.74	2.55%	0.0455
Mining	32797.75	5.02%	0.0100	38775.50	3.13%	0.0122
Manufacturing	28721.19	27.64%	0.0130	30755.61	31.27%	0.0125
Production and distribution of electricity, gas, and water	30927.97	2.69%	0.0126	33238.65	1.48%	0.0100
Construction	33629.13	5.31%	0.0126	30534.41	12.02%	0.0229
Transport, storage, and postal service	34923.02	8.61%	0.0158	37086.73	6.04%	0.0115
Communication, computer engineering, and software service	32203.18	0.59%	0.0276	62528.86	2.06%	0.0405
Wholesale and retail trade	29423.23	7.99%	0.0229	27223.30	8.23%	0.0168
Accommodation and catering	25676.79	3.82%	0.0154	24255.52	2.66%	0.0165
Finance	53839.50	3.71%	0.0197	54583.50	3.56%	0.0183
Real estate	36463.51	0.73%	0.0131	30449.39	1.45%	0.0189
Leasing and business service	44087.02	0.49%	0.0236	33719.14	1.68%	0.0144
R&D, technical service, and geologic prospecting	50878.07	0.39%	0.0078	49567.39	0.86%	0.0125
Management of water conservancy, environment, and public facilities	63417.29	0.23%	0.0107	21473.34	0.56%	0.0210
Household service and other service	23939.77	4.62%	0.0209	24605.05	1.76%	0.0181
Education	37488.14	9.34%	0.0084	37280.86	5.98%	0.0145
Health, social insurance, and social welfare	29816.22	3.64%	0.0128	43742.22	2.94%	0.0536
Entertainment, culture, and sports	45740.54	1.93%	0.0193	40604.59	1.31%	0.0214
Public administration and social organization	30188.70	9.71%	0.0126	35679.21	6.75%	0.0218
Other	50021.61	1.28%	0.0246	28904.54	2.01%	0.0170
Invalid answers	26465.64	1.68%	0.0119	32249.61	1.69%	0.0094
Total	31276.17	100%	0.0133	32170.32	100%	0.0163

Note: 1. Zero labor wages are not included.
2. The data used are from China Family Panel Studies (CFPS).

Table 6: Coefficients of population share P_i, income share S_i, and Theil's T index L_i

	2010			2012		
Coefficient / Economic sector	A_{S_i}	A_{P_i}	A_{L_i}	A_{S_i}	A_{P_i}	A_{L_i}
Invalid answers	1.018	-0.849	0.017	1.151	-1.009	0.017
Agriculture, forestry, livestock, and fishery	0.627	-0.577	0.006	1.191	-0.583	0.025
Mining	1.212	-1.052	0.050	1.383	-1.213	0.031
Manufacturing	1.151	-0.921	0.276	1.187	-0.962	0.313
Production and distribution of electricity, gas, and water	1.188	-0.992	0.027	1.188	-1.040	0.015
Construction	1.279	-1.078	0.053	1.346	-0.955	0.120
Transport, storage, and postal service	1.376	-1.120	0.086	1.335	-1.160	0.060
Communication, computer engineering, and software service	1.419	-1.033	0.006	2.264	-1.957	0.021
Wholesale and retail trade	1.324	-0.944	0.080	1.123	-0.852	0.082
Accommodation and catering	1.054	-0.823	0.038	0.985	-0.759	0.027
Finance	1.848	-1.727	0.037	1.815	-1.708	0.036
Real estate	1.341	-1.169	0.007	1.236	-0.953	0.015
Leasing and business service	1.664	-1.414	0.005	1.270	-1.055	0.017
R&D, technical service, and geologic prospecting	1.593	-1.632	0.004	1.614	-1.551	0.009
Management of water conservancy, environment, and public facilities	1.842	-2.034	0.002	0.905	-0.672	0.006
Household service and other service	1.078	-0.768	0.046	1.018	-0.770	0.018
Education	1.324	-1.202	0.093	1.389	-1.167	0.060
Health, social insurance, and social welfare	1.159	-0.956	0.036	2.137	-1.369	0.029
Entertainment, culture, and sports	1.670	-1.467	0.019	1.552	-1.271	0.013
Public administration and social organization	1.181	-0.968	0.097	1.467	-1.116	0.067
Other	1.825	-1.604	0.013	1.162	-0.904	0.020

Note: 1. Zero labor wages are not included.
2. The data used are from China Family Panel Studies (CFPS).

Table 7: Accounting for the change in labor earnings inequality

Economic sector \ Contribution	S_i	P_i	L_i	S_i (% Share)	P_i (% Share)	L_i (% Share)
Invalid answers	0.000	0.003	-0.001	0.310%	4.765%	-1.162%
Agriculture, forestry, livestock, and fishery	0.018	-0.019	0.009	30.521%	-33.319%	15.048%
Mining	-0.024	0.025	0.001	-42.187%	42.743%	1.967%
Manufacturing	0.042	-0.023	-0.002	73.072%	-40.240%	-4.063%
Production and distribution of electricity, gas, and water	-0.014	0.013	-0.001	-24.771%	22.570%	-1.688%
Construction	0.088	-0.078	0.016	151.867%	-134.227%	28.096%
Transport, storage, and postal service	-0.035	0.028	-0.006	-60.142%	48.880%	-9.726%
Communication, computer engineering, and software service	0.027	-0.007	0.003	46.516%	-12.296%	4.711%
Wholesale and retail trade	0.003	-0.011	-0.008	5.157%	-18.548%	-13.846%
Accommodation and catering	-0.012	0.009	0.000	-20.319%	15.405%	0.727%
Finance	-0.003	0.001	-0.001	-4.644%	1.859%	-1.380%
Real estate	0.009	-0.010	0.001	16.063%	-16.469%	1.859%
Leasing and business service	0.017	-0.015	-0.001	30.045%	-26.459%	-1.902%
R&D, technical service, and geologic prospecting	0.008	-0.005	0.000	13.243%	-8.811%	0.776%
Management of water conservancy, environment, and public facilities	0.005	-0.010	0.001	7.971%	-16.927%	1.161%
Household service and other service	-0.030	0.029	-0.002	-51.707%	49.518%	-3.462%
Education	-0.046	0.031	0.007	-78.647%	54.018%	12.546%
Health, social insurance, and social welfare	-0.011	0.019	0.020	-19.641%	33.093%	35.110%
Entertainment, culture, and sports	-0.010	0.004	0.000	-17.117%	6.653%	0.726%
Public administration and social organization	-0.039	0.042	0.012	-67.549%	71.582%	20.429%
Other	0.011	-0.018	-0.001	18.710%	-30.717%	-2.549%
Change in Overall Inequality	0.058 (100%)					
Residual	0.002 (3.204%)					

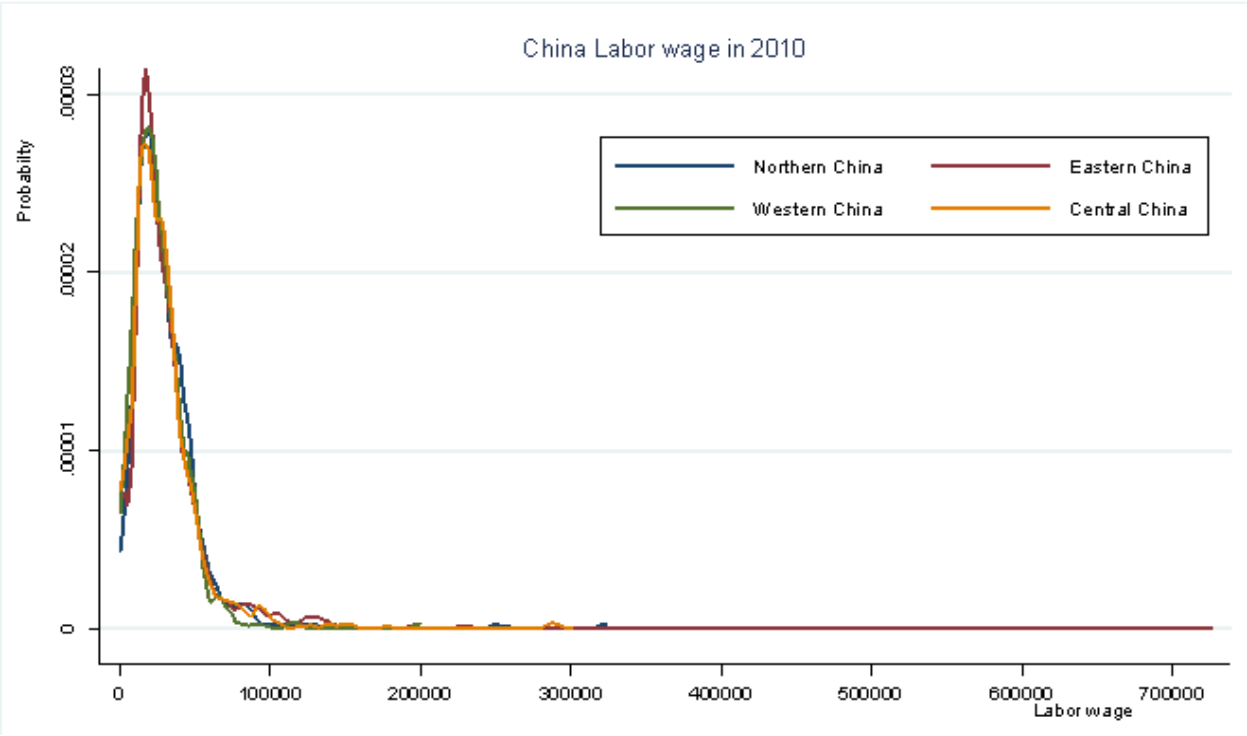
Note: 1. Zero labor wages are not included.
2. The data used are from China Family Panel Studies (CFPS).

Table 8: Inequality elasticities

Elasticity / Economic sector	2010			2012		
	E_{S_i}	E_{P_i}	E_{L_i}	E_{S_i}	E_{P_i}	E_{L_i}
Invalid answers	0.067	-0.066	0.012	0.062	-0.054	0.008
Agriculture, forestry, livestock, and fishery	0.015	-0.024	0.004	0.097	-0.081	0.059
Mining	0.239	-0.197	0.032	0.138	-0.100	0.019
Manufacturing	1.247	-1.084	0.253	1.185	-0.999	0.225
Production and distribution of electricity, gas, and water	0.125	-0.105	0.021	0.056	-0.047	0.007
Construction	0.267	-0.208	0.043	0.517	-0.384	0.151
Transport, storage, and postal service	0.465	-0.338	0.089	0.258	-0.193	0.036
Communication, computer engineering, and software service	0.033	-0.023	0.009	0.149	-0.066	0.039
Wholesale and retail trade	0.415	-0.313	0.120	0.295	-0.263	0.074
Accommodation and catering	0.158	-0.150	0.037	0.084	-0.085	0.022
Finance	0.269	-0.146	0.044	0.207	-0.114	0.032
Real estate	0.038	-0.029	0.005	0.057	-0.046	0.013
Leasing and business service	0.032	-0.019	0.006	0.068	-0.054	0.012
R&D, technical service, and geologic prospecting	0.024	-0.015	0.002	0.045	-0.028	0.005
Management of water conservancy, environment, and public facilities	0.016	-0.009	0.001	0.016	-0.018	0.005
Household service and other service	0.195	-0.181	0.062	0.057	-0.056	0.016
Education	0.485	-0.366	0.051	0.265	-0.191	0.045
Health, social insurance, and social welfare	0.165	-0.143	0.029	0.201	-0.094	0.077
Entertainment, culture, and sports	0.126	-0.076	0.022	0.065	-0.042	0.013
Public administration and social organization	0.449	-0.381	0.081	0.316	-0.216	0.077
Other	0.092	-0.050	0.018	0.074	-0.064	0.017

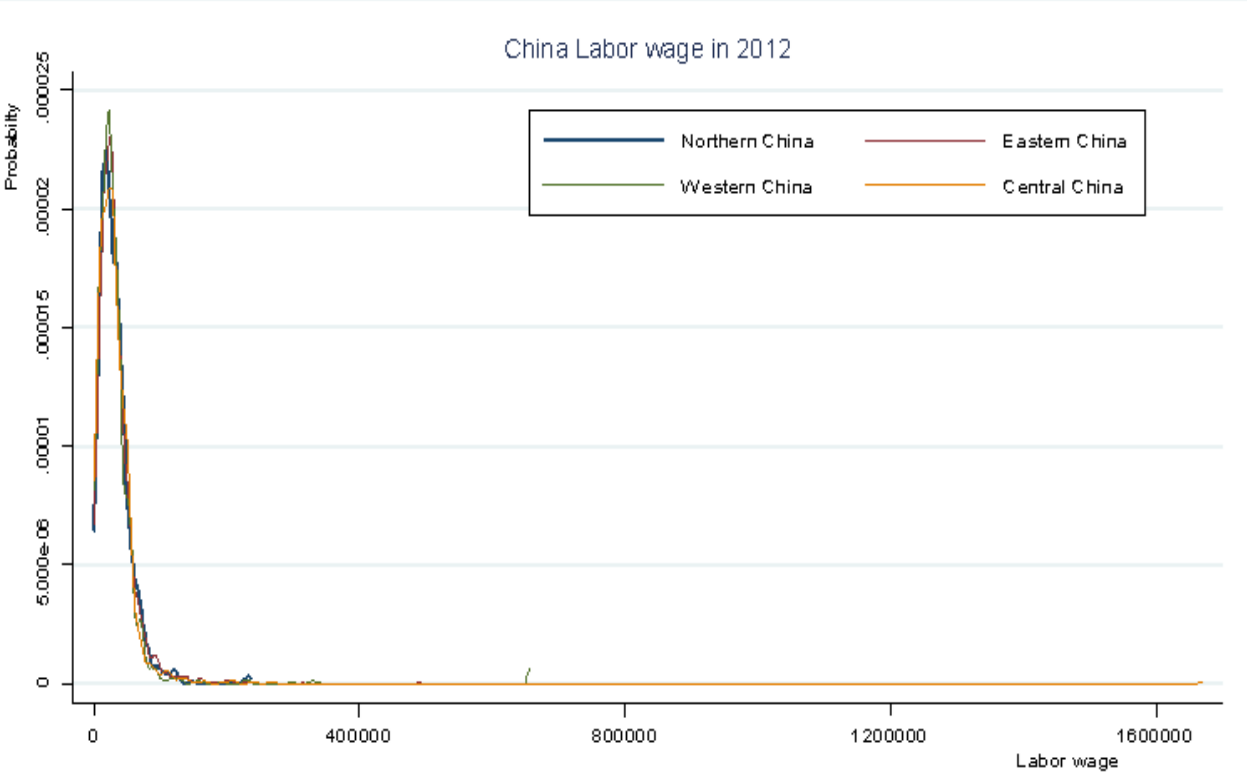
Note: 1. Zero labor wages are not included.
2. The data used are from China Family Panel Studies (CFPS).

Graph 3:



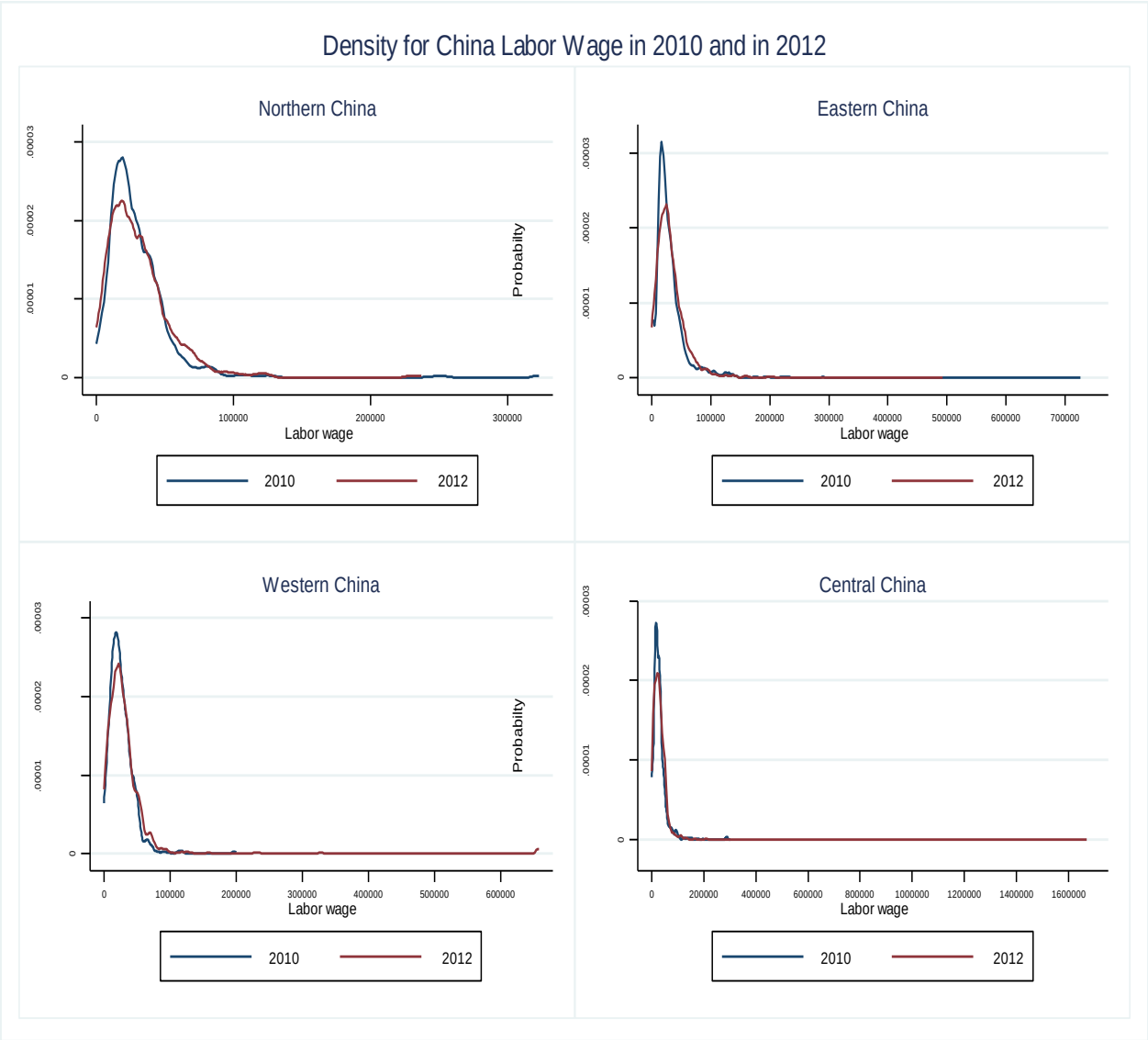
Note: The data used are from China Family Panel Studies (CFPS).

Graph 4:



Note: The data used are from China Family Panel Studies (CFPS).

Graph 5:



Note: The data used are from China Family Panel Studies (CFPS).

Graph 6:

Note: The data used are from China Family Panel Studies (CFPS).

Table 9: Regional real labor earnings inequality

	Inequality measure	Northern China	Eastern China	Western China	Central China
2010	Gini	0.351	0.398	0.328	0.376
	Theil's T index	0.235	0.314	0.191	0.267
2012	Gini	0.382	0.378	0.450	0.392
	Theil's T index	0.253	0.248	0.493	0.297

Note: 1. Zero labor wages are not included.
2. The data used are from China Family Panel Studies (CFPS).

Table 10: Regression results for 2010 labor earnings

Variable	(1) China	(2) Northern China	(3) Eastern China	(4) Western China	(5) Central China
Gender	0.489***	0.556***	0.428***	0.476***	0.515***
	(0.0496)	(0.126)	(0.0733)	(0.128)	(0.0928)
Age	0.0519***	0.0270***	0.0673***	0.0434***	0.0440***
	(0.00462)	(0.00956)	(0.00663)	(0.0107)	(0.00938)
Marry	-0.0607	0.0658	-0.216**	0.232	0.00257
	(0.0603)	(0.0896)	(0.0912)	(0.160)	(0.122)
Retire	-1.504***	-0.816**	-1.812***	-1.563***	-1.504***
	(0.181)	(0.320)	(0.358)	(0.446)	(0.262)
Job_2	4.498***	--	2.208**	3.646***	5.786***
	(0.717)		(0.859)	(0.960)	(0.887)
Job_3	5.074***	6.730***	3.700***	4.767***	6.037***
	(0.385)	(1.018)	(0.652)	(0.996)	(0.689)
Job_4	4.925***	6.490***	4.212***	4.466***	5.548***
	(0.373)	(1.020)	(0.485)	(1.035)	(0.728)
Job_5	4.707***	6.535***	3.930***	4.120***	5.438***
	(0.400)	(1.025)	(0.533)	(1.133)	(0.784)
Job_6	4.994***	6.694***	4.119***	4.819***	5.661***
	(0.386)	(0.986)	(0.524)	(1.013)	(0.740)
Job_7	4.939***	6.459***	4.482***	4.218***	5.482***
	(0.383)	(1.015)	(0.499)	(1.063)	(0.758)
Job_8	4.837***	6.676***	4.058***	4.050***	5.478***
	(0.395)	(0.913)	(0.520)	(1.105)	(0.809)
Job_9	4.889***	6.660***	4.038***	4.275***	5.677***
	(0.374)	(0.915)	(0.508)	(1.008)	(0.708)
Job_10	5.060***	6.524***	4.257***	4.664***	5.791***
	(0.364)	(0.963)	(0.492)	(1.005)	(0.682)
Job_11	4.849***	6.735***	4.158***	4.629***	5.304***
	(0.424)	(1.025)	(0.557)	(1.136)	(0.855)
Job_12	5.140***	6.667***	4.442***	4.042***	5.823***
	(0.393)	(0.980)	(0.485)	(1.159)	(0.758)
Job_13	4.727***	6.783***	3.837***	--	5.072***
	(0.511)	(1.056)	(0.643)		(0.972)
Job_14	4.725***	6.718***	3.192***	--	5.536***
	(0.443)	(1.119)	(0.793)		(0.828)
Job_15	4.919***	--	3.975***	5.322***	5.314***
	(0.516)		(0.578)	(1.211)	(0.903)
Job_16	4.782***	6.244***	4.052***	4.187***	5.577***
	(0.381)	(1.015)	(0.502)	(1.094)	(0.735)

Job_17	4.642***	6.491***	3.846***	4.297***	5.279***
	(0.408)	(1.038)	(0.535)	(1.144)	(0.778)
Job_18	4.660***	6.415***	3.852***	4.098***	5.411***
	(0.396)	(0.994)	(0.545)	(1.109)	(0.760)
Job_19	4.815***	--	3.998***	5.372***	5.249***
	(0.430)		(0.569)	(0.921)	(0.834)
Job_20	4.368***	6.410***	3.725***	3.751***	5.002***
	(0.418)	(1.056)	(0.541)	(1.154)	(0.831)
Job_21	5.353***	7.368***	4.145***	3.052**	6.224***
	(0.457)	(0.924)	(0.716)	(1.502)	(0.747)
Urban	0.0763	0.245*	0.131	-0.169	0.0852
	(0.0515)	(0.137)	(0.0801)	(0.159)	(0.0876)
Eduy	0.0335***	0.000410	0.0459***	0.0119	0.0384**
	(0.00766)	(0.0229)	(0.0119)	(0.0192)	(0.0164)
IQ	0.351***	0.214**	0.432***	0.406***	0.262***
	(0.0353)	(0.0867)	(0.0520)	(0.0921)	(0.0610)
Father edu	0.0187***	0.00850	0.0298***	0.00628	0.0228**
	(0.00520)	(0.0107)	(0.00808)	(0.0145)	(0.0100)
Word test	0.0366***	0.0341**	0.0283***	0.0661***	0.0311***
	(0.00575)	(0.0149)	(0.00797)	(0.0174)	(0.00848)
Observations	3,486	558	1,604	515	809
R-squared	0.991	0.994	0.990	0.992	0.991

Notes: 1. Robust standard errors are in parentheses.
2. ***, **, and * represent significance at the 1%, 5%, and 10% levels respectively.
3. The data used are from China Family Panel Studies (CFPS).
4. Some of regressors are omitted because of collinearity.

Table 11: Regression results for 2012 labor earnings

Variable	(1) China	(2) Northern China	(3) Eastern China	(4) Western China	(5) Central China
Gender	0.484***	0.515***	0.372***	0.538***	0.547***
	(0.0522)	(0.0860)	(0.0680)	(0.146)	(0.136)
Age	0.0263***	0.00322	0.0189***	0.0398***	0.0376***
	(0.00397)	(0.00684)	(0.00622)	(0.00901)	(0.00844)
Marry	0.140*	0.00410	0.135	0.0875	0.246
	(0.0744)	(0.119)	(0.0957)	(0.203)	(0.199)
Retire	-0.637***	-0.0795	-0.556**	-1.639***	-0.488
	(0.189)	(0.244)	(0.226)	(0.434)	(0.456)
Job_2	4.118***	6.066***	5.838***	2.786***	2.578***
	(0.446)	(0.746)	(0.763)	(0.707)	(0.715)
Job_3	4.954***	7.079***	6.839***	2.379***	3.872***
	(0.446)	(0.680)	(0.815)	(0.760)	(0.690)
Job_4	4.947***	6.944***	6.772***	2.818***	3.649***
	(0.419)	(0.660)	(0.762)	(0.655)	(0.658)
Job_5	4.667***	6.778***	6.499***	2.971***	3.315***
	(0.454)	(0.691)	(0.822)	(0.662)	(0.881)
Job_6	4.817***	7.103***	6.631***	2.852***	3.497***
	(0.417)	(0.617)	(0.788)	(0.633)	(0.660)
Job_7	5.057***	6.727***	6.897***	3.328***	3.837***
	(0.425)	(0.720)	(0.780)	(0.641)	(0.662)
Job_8	4.800***	6.584***	6.889***	2.369***	3.231***
	(0.475)	(0.878)	(0.833)	(0.815)	(0.795)
Job_9	4.792***	6.654***	6.591***	2.924***	3.527***
	(0.416)	(0.640)	(0.761)	(0.627)	(0.672)
Job_10	4.876***	7.073***	6.570***	2.998***	3.617***
	(0.422)	(0.658)	(0.755)	(0.754)	(0.675)
Job_11	4.877***	7.371***	7.017***	1.983**	3.015***
	(0.474)	(0.725)	(0.846)	(0.815)	(0.771)
Job_12	4.808***	6.561***	6.571***	3.413***	3.218***
	(0.458)	(0.698)	(0.802)	(0.733)	(0.712)
Job_13	4.709***	6.692***	6.617***	2.624***	3.320***
	(0.462)	(0.712)	(0.820)	(0.676)	(0.736)
Job_14	4.670***	7.086***	6.712***	3.183***	2.868***
	(0.484)	(0.821)	(0.829)	(0.810)	(0.864)
Job_15	4.420***	6.444***	6.227***	4.967***	3.042***
	(0.482)	(0.719)	(0.872)	(1.122)	(0.788)
Job_16	4.888***	6.932***	6.559***	3.340***	3.441***

	(0.410)	(0.611)	(0.773)	(0.589)	(0.711)
Job_17	4.486***	6.900***	6.404***	2.618***	2.790***
	(0.464)	(0.691)	(0.856)	(0.669)	(0.754)
Job_18	4.601***	7.158***	6.654***	2.380***	2.723***
	(0.446)	(0.645)	(0.815)	(0.662)	(0.797)
Job_19	5.068***	6.761***	6.849***	2.935***	3.556***
	(0.454)	(0.707)	(0.796)	(0.741)	(0.772)
Job_20	4.333***	6.776***	6.440***	2.517***	2.096***
	(0.457)	(0.695)	(0.827)	(0.640)	(0.793)
Job_21	4.858***	7.482***	7.236***	4.307***	2.565***
	(0.609)	(0.647)	(0.638)	(0.466)	(0.981)
Urban	0.0498	-0.0640	0.119	0.0428	-0.145
	(0.0658)	(0.0982)	(0.0890)	(0.156)	(0.131)
Eduy2012	0.118***	0.0724***	0.103***	0.131***	0.124***
	(0.00947)	(0.0150)	(0.0155)	(0.0207)	(0.0178)
IQ	0.394***	0.303***	0.188***	0.619***	0.534***
	(0.0438)	(0.0805)	(0.0651)	(0.0941)	(0.0757)
Series test	0.0342***	-0.00539	0.0223**	0.0454***	0.0597***
	(0.00683)	(0.0127)	(0.0106)	(0.0159)	(0.0153)
Children No.	-0.0396	0.0887	-0.0863	0.000741	-0.150*
	(0.0432)	(0.108)	(0.0587)	(0.112)	(0.0867)
Observations	3227	527	1409	551	740
R-squared	0.988	0.994	0.992	0.988	0.983

Notes: 1. Robust standard errors are in parentheses.
2. ***, **, and * represent significance at the 1%, 5%, and 10% levels respectively.
3. The data used are from China Family Panel Studies (CFPS).

Table 12: Two years inequality comparison

Year	Labor earnings	Inequality measure	Total inequality	Between-group inequality	Sum of within-group inequality
2010	Real labor earnings	Theil's T index	0.255	0.016	0.239
		Normalized Theil's T index	1.330%	0.081%	1.249%
		Percentage	100%	6.275%	93.725%
	Normal labor earnings	Theil's T index	0.281	0.017	0.264
		Normalized Theil's T index	1.466%	0.091%	1.375%
		Percentage	100%	6.050%	93.950%
2012	Real labor earnings	Theil's T index	0.313	0.015	0.298
		Normalized Theil's T index	1.632%	0.079%	1.553%
		Percentage	100%	4.792%	95.208%
	Normal labor earnings	Theil's T index	0.321	0.017	0.304
		Normalized Theil's T index	1.673%	0.086%	1.587%
		Percentage	100%	5.296%	94.704%

Note: 1. Zero labor wages are not included.
2. The data used are from China Family Panel Studies (CFPS)

Table 13: Multiple-equation GMM

Variable	Coefficient	Robust Std. Err.	z	P>z	95% Confidence Interval	
2010: gender	0.372***	0.063	5.880	0.000	0.248	0.496
2010: age	0.010**	0.004	2.390	0.017	0.002	0.018
2010: marry	0.120	0.085	1.420	0.155	-0.046	0.287
2010: retire	4.842	23.777	0.200	0.839	-41.760	51.443
2010: job_2	8.620***	1.675	5.150	0.000	5.337	11.904
2010: job_3	8.412***	0.253	33.270	0.000	7.917	8.908
2010: job_4	8.350***	0.235	35.490	0.000	7.889	8.811
2010: job_5	8.292***	0.267	31.080	0.000	7.769	8.815
2010: job_6	8.299***	0.243	34.130	0.000	7.822	8.776
2010: job_7	8.440***	0.231	36.600	0.000	7.988	8.892
2010: job_8	8.278***	0.289	28.650	0.000	7.711	8.844
2010: job_9	8.139***	0.243	33.480	0.000	7.662	8.615
2010: job_10	8.263***	0.287	28.810	0.000	7.701	8.826
2010: job_11	8.644***	0.268	32.250	0.000	8.119	9.170
2010: job_12	8.416***	0.262	32.090	0.000	7.902	8.931
2010: job_13	8.122***	0.264	30.760	0.000	7.604	8.639
2010: job_14	8.873***	0.331	26.820	0.000	8.224	9.521
2010: job_16	8.076***	0.244	33.050	0.000	7.597	8.555
2010: job_17	8.358***	0.257	32.510	0.000	7.854	8.862
2010: job_18	8.223***	0.252	32.570	0.000	7.728	8.718
2010: job_19	8.521***	0.304	28.060	0.000	7.926	9.116

2010: job_20	8.155***	0.268	30.440	0.000	7.630	8.680
2010: job_21	7.892***	0.376	20.990	0.000	7.155	8.629
2010: eduy	0.062***	0.012	5.280	0.000	0.039	0.085
2010: IQ	0.054**	0.025	2.190	0.029	0.006	0.102
2010: feduy	0.011	0.008	1.320	0.186	-0.005	0.027
2010: series test	0.012*	0.007	1.660	0.097	-0.002	0.027
2012: gender	0.319***	0.067	4.760	0.000	0.187	0.450
2012: age	0.006	0.007	0.940	0.347	-0.007	0.020
2012: marry12	-0.014	0.095	-0.140	0.886	-0.200	0.173
2012: retire12	-0.041	0.186	-0.220	0.826	-0.405	0.324
2012: job12_2	8.412***	0.502	16.740	0.000	7.427	9.397
2012: job12_3	9.005***	0.328	27.480	0.000	8.363	9.648
2012: job12_4	8.723***	0.301	28.960	0.000	8.133	9.314
2012: job12_5	8.637***	0.362	23.870	0.000	7.928	9.346
2012: job12_6	8.648***	0.306	28.300	0.000	8.049	9.247
2012: job12_7	8.629***	0.346	24.920	0.000	7.950	9.307
2012: job12_8	8.694***	0.439	19.800	0.000	7.834	9.555
2012: job12_9	8.570***	0.284	30.220	0.000	8.014	9.126
2012: job12_10	8.783***	0.339	25.880	0.000	8.118	9.448
2012: job12_11	8.947***	0.387	23.090	0.000	8.188	9.706
2012: job12_12	8.448***	0.367	23.000	0.000	7.728	9.168
2012: job12_13	8.659***	0.312	27.800	0.000	8.048	9.269
2012: job12_14	8.894***	0.354	25.110	0.000	8.200	9.589
2012: job12_15	7.480***	0.731	10.230	0.000	6.047	8.914
2012: job12_16	8.847***	0.371	23.830	0.000	8.119	9.574
2012: job12_17	8.648***	0.305	28.380	0.000	8.051	9.245
2012: job12_18	8.487***	0.350	24.230	0.000	7.801	9.174
2012: job12_19	8.877***	0.359	24.750	0.000	8.174	9.580
2012: job12_20	8.378***	0.330	25.390	0.000	7.731	9.025
2012: eduy2012	0.044*	0.025	1.790	0.074	-0.004	0.092
2012: IQ	-0.006	0.031	-0.190	0.852	-0.067	0.056
2012: feduy	0.072	0.047	1.530	0.125	-0.020	0.164
2012: series test	0.009	0.008	1.080	0.280	-0.007	0.025
N	1007					

Notes: 1. Robust standard errors are in parentheses.
2. ***, **, and * represent significance at the 1%, 5%, and 10% levels respectively.
3. The data used are from China Family Panel Studies (CFPS).
4. Some of regressors are omitted because of collinearity.

Table 14: Normal labor earnings by quantile subgroups

	2010			2012		
Quantile group	Labor earnings mean	Labor earnings share (%)	Normalized Theil's T index	Labor earnings mean	Labor earnings share (%)	Normalized Theil's T index
1	6322.15	2.62	0.36%	3510.37	1.31	0.93%
2	9989.96	4.14	0.31%	9325.26	3.48	0.91%
3	12451.26	5.16	0.30%	15542.10	5.80	0.83%
4	14164.52	5.87	0.31%	13237.58	4.94	0.83%
5	17518.63	7.26	0.36%	19829.58	7.40	0.82%
6	20390.15	8.45	0.41%	23849.09	8.90	0.82%
7	23961.44	9.93	0.48%	33897.86	12.65	0.86%
8	29607.94	12.27	0.56%	31620.14	11.80	0.91%
9	33951.40	14.07	0.68%	47912.55	17.88	1.03%
10	72921.92	30.22	0.84%	69242.75	25.84	1.08%
Total	24130.36	100	1.47%	26796.73	100	1.67%

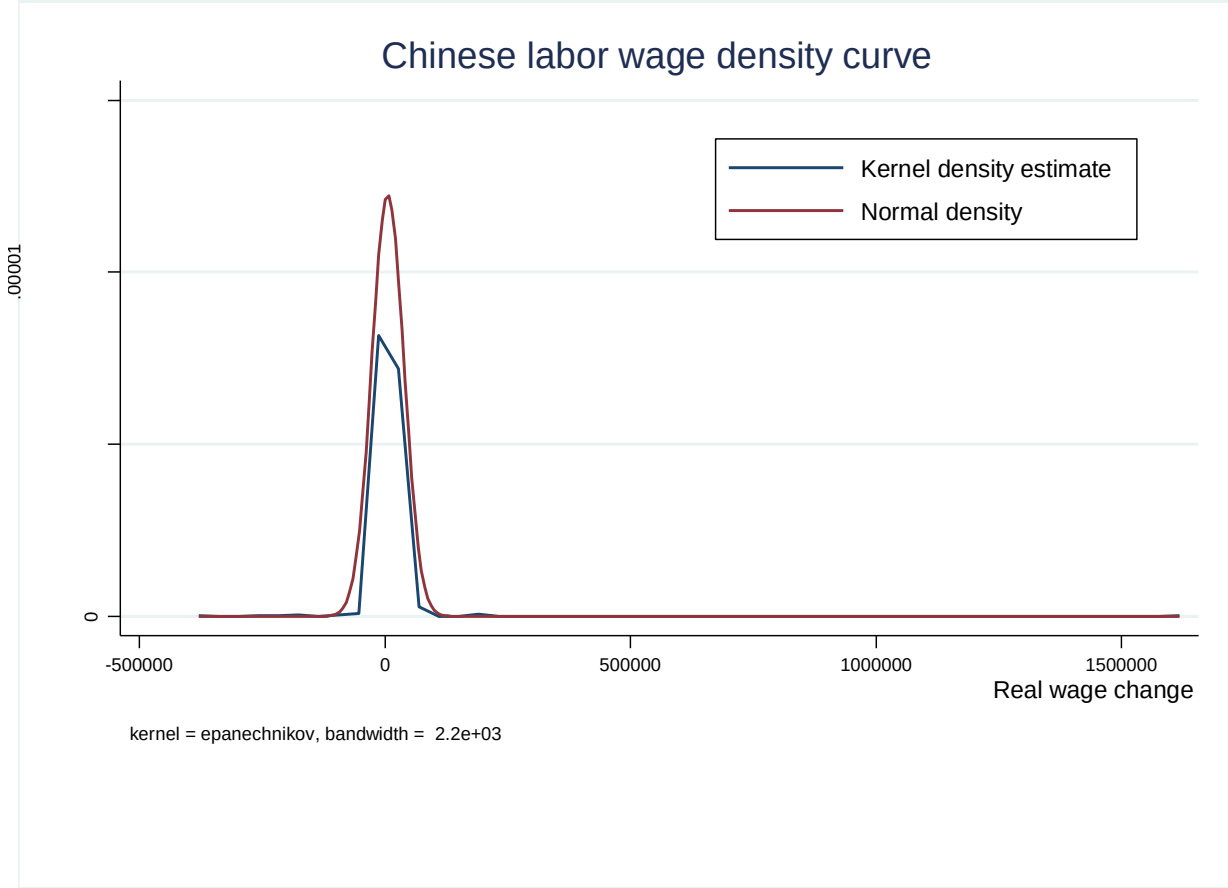
Note: 1. Zero labor wages are not included.
2. The data used are from China Family Panel Studies (CFPS).

Table 15: Real labor earnings by quantile subgroups

	2010			2012		
Quantile group	Real labor earnings mean	Labor earnings share (%)	Normalized Theil's T index	Real labor earnings mean	Labor earnings share (%)	Normalized Theil's T index
1	8350.74	2.67	0.35%	4214.31	1.31	0.95%
2	13323.65	4.26	0.30%	11034.42	3.43	0.92%
3	16201.06	5.18	0.29%	15377.41	4.78	0.82%
4	19297.40	6.17	0.31%	20202.96	6.28	0.82%
5	23113.09	7.39	0.35%	24481.61	7.61	0.81%
6	26803.68	8.57	0.40%	29049.80	9.03	0.81%
7	32495.94	10.39	0.47%	33585.81	10.44	0.84%
8	36624.40	11.71	0.55%	40534.60	12.6	0.89%
9	46570.22	14.89	0.67%	50957.79	15.84	0.98%
10	89981.54	28.77	0.75%	92232.31	28.67	1.16%
Total	31276.17	100	1.33%	32170.32	100	1.63%

Note: 1. Zero labor wages are not included.
2. The data used are from China Family Panel Studies (CFPS).

Graph 7:



Note: The data used are from China Family Panel Studies (CFPS)

Table 16: Panel earnings changes by initial earnings quintile subgroups

Labor earnings Quintile	0%~20%	20%~40%	40%~60%	60%~80%	80%~100%
Panel earnings change mean (yuan)	11123.24	6727.96	6498.07	5474.44	-845.93

Note: The data used are from China Family Panel Studies (CFPS).

Table 17: Chinese labor earnings quintile transition matrix, 2010-2012

	Quintile in 2012					
Quintile in 2010	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5	Total
Quintile 1	53.42%	27.19%	11.22%	6.27%	1.90%	100%
Quintile 2	25.10%	36.38%	25.10%	10.31%	3.11%	100%
Quintile 3	13.77%	26.00%	30.78%	20.65%	8.80%	100%
Quintile 4	8.08%	8.65%	26.73%	36.92%	19.62%	100%
Quintile 5	5.35%	1.78%	7.33%	24.75%	60.79%	100%

Note: The data used are from China Family Panel Studies (CFPS).

Table 18: Conditional Micro Mobility Regression

Variable	Coefficient	95% Confidence Interval	
Wage hat	0.253**	0.037	0.469
	(0.110)		
Gender	0.0336	-0.206	0.273
	(0.122)		
Age	-0.0144	-0.037	0.008
	(0.0115)		
Eduy2012	0.0423*	-0.001	0.085
	(0.0220)		
IQ	0.167***	0.055	0.279
	(0.0572)		
Work out	0.0782	-0.268	0.424
	(0.176)		
Feduy	0.00372	-0.026	0.033
	(0.0152)		
Number series test	0.0526***	0.021	0.084
	(0.0162)		
Children No.	-0.0233	-0.217	0.171
	(0.0990)		
Marry	0.118	-0.244	0.480
	(0.185)		
Marry12	-0.176	-0.612	0.260
	(0.223)		
Retire	-0.127	-2.023	1.769
	(0.967)		
Retire12	-0.968	-2.593	0.657
	(0.829)		
Job12_2	5.810***	3.207	8.413
	(1.328)		
Job12_3	4.927***	2.321	7.534
	(1.330)		
Job12_4	4.952***	2.396	7.507
	(1.304)		
Job12_5	4.469***	1.960	6.978
	(1.280)		
Job12_6	4.954***	2.234	7.673
	(1.388)		
Job12_7	5.179***	2.601	7.757
	(1.316)		
Job12_8	5.113***	2.479	7.747
	(1.344)		
Job12_9	4.635***	2.120	7.150
	(1.283)		
Job12_10	4.980***	2.440	7.520
	(1.296)		
Job12_11	5.796***	3.118	8.475
	(1.367)		
Job12_12	5.177***	2.565	7.790
	(1.333)		
Job12_13	4.417***	1.822	7.011
	(1.324)		
Job12_14	5.067***	2.476	7.658

	(1.322)		
Job12_15	4.022***	1.537	6.508
	(1.268)		
Job12_16	4.886***	2.276	7.496
	(1.332)		
Job12_17	4.586***	2.002	7.169
	(1.318)		
Job12_18	4.612***	1.974	7.249
	(1.346)		
Job12_19	5.047***	2.334	7.760
	(1.384)		
Job12_20	4.477***	1.992	6.961
	(1.268)		
Job12_21	--	--	--
Observations		758	

Notes: 1. Robust standard errors are in parentheses.
2. ***, **, and * represent significance at the 1%, 5%, and 10% levels respectively.
3. The data used are from China Family Panel Studies (CFPS).
4. Some of regressors are omitted because of collinearity.

REFERENCES

Aghion, P., Caroli, E., & García-Peñalosa, C. (1999, Dec.). Inequality and Economic Growth: The Perspective of the New Growth Theories. *Journal of Economic Literature , 37* (4), pp. 1615-1660.

Anand, S., & Kanbur, S. (1993, June). Inequality and Development: A Critique. *Journal of Development Economics , 41* (1), pp. 19-43.

Atkinson, A. B. (1970, Nov.). On the Measurement of Inequality . *J. Econ. Theory , 2* (3), pp. 244-263.

Basu, K. (2013). Shared Prosperity and the Mitigation of poverty: in Practice and in Precept. *Policy Research Working Paper Series 6700* .

Brandt, L., & Holz, C. (2006). Spatial Price Differences in China: Estimates and Implications. *Economic Development and Cultural Change , 55* (1), pp. 43-86 .

Dalton, H. (1920). The Measurement of the Inequality of Incomes. *Economic Journal , 30*, pp. 348-361.

Deininger, K., & Squire, L. (1996). A New Data Set Measuring Income Inequality. *World Bank Economic Review , 10* (3), pp. 565-591.

Fields, G. S. (1991). Growth and Income Distribution. In G. Psacharopoulos (Ed.), *Essays on Poverty, Equity, and Growth.* Oxford; New York: Pergamon Press for the World Bank.

Fields, S. (2001). *Distribution and Development: A New Look at the Developing World.* MIT Press.

Fields, S. (2015). What We Know (and Want to Know) about Earnings Mobility in Developing Countries. In Distribution and Development: A New Look at the Developing World.

Fields, S., & Kanbur, R. (2007). Minimum Wages and Poverty with Income-sharing. *J Econ Inequal , 5*, pp. 135-147.

Foster, J. E. (1985). Inequality Measurement. In H. P. Young (Ed.), *Fair Allocation* (Vol. 33, pp. 31-68). Amercican Mathematical Society.

Friedman, M. (1962). *Capitalism and Freedom.* Chicago: University of Chicago Press.

Glomm, G., & Ravikumar, B. (1998, April). Increasing Returns, Human Capital, and the Kuznets Curve. *Journal of Development Economics , 55* (2), pp. 353-367.

Goglio, A., & Xenogiani, T. (2012). Chapter 2: Inequality: Recent Trends in China and Experience in the OECD Area. In *China in Focus: Lessons and Challenges* (pp. 16-31).

Griliches, Z. (1976, Aug.). Wages of Very Young Men. *The Journal of Political Economy , 84* (4), pp. S69-S86.

Hayashi, F. (2000). *Econometrics .* Princeton: Princeton University Press.

Kanbur, R., & Zhang, X. (2005). Fifty Years of Regional Inequality in China: A Journey through Central Planning, Reform, and Openness . *Review of Development Economics , 9*, pp. 87-106.

Kanbur, R., & Zhuang, J. (2013, January). Urbanization and Inequality in Asia. *Asian Development Review , 30* (1), pp. 131-147.

Kuznets, S. (1955). Economic Growth and Income Inequality. *American Economic Review , 45*, pp. 1-28.

Levy, F., & Murnane, J. R. (1992, Sep.). U.S. Earnings Levels and Earnings Inequality: A Review of Recent Trends and Proposed Explanations. *Journal of Economic Literature , 30* (3), pp. 1333-1381.

Lorenz, M. (1905). Methods of Measuring the Concentration of Wealth . *Publications of the American Statistical Association , 9* (70), pp. 209-219.

Love, R., & Wolfson, M. (1976). *Income Inequality: Statistical Methodology and Canadian Illustrations.* Ottawa: Infornation Canada.

Mincer, J. (1958). Investment in Human Capital and Personal Income Distribution. *Journal of Political Economy , 66*, pp. 281-302.

Pigou, A. C. (1912). *Wealth and Welfare.* London: Macmillan and Company.

Sen, A. K. (1997). From Income Inequality to Economic Inequality. *Southern Economic Journal , 64* (2), pp. 384-401.

Sen, A. (1973). *On Economic Inequality.* Oxford : Clarendon Press.

Sicular, T. (2013, August). The Challenge of High Inequality in China. *Inequality in Focus , 2* (2), pp. 1-5.

Theil, H. (1967). *Economics and Information Theory* (Vol. 7). Amsterdam: North-Holland.

Wu, Q., Dai, L., Cui, Y., Zhang, W., Zhang, C., Chen, J., et al. (2015). Supplement to the User's Manual for the 2012 CFPS Data.

Xie, Y. (2012). China Family Panel Studies (2010) User's Manual.