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Yoko ASUYAMA*

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This paper analyzes the causes of earnings inequality in urban China from 1988 to 2002. Earnings inequality in urban China continuously increased, even when adjusting for regional price differences. This paper reveals how the causes of earnings inequality changed between the periods 1988-1995 and 1995-2002 by reflecting labor-related institutional reform in China. Contrary to the situation from 1988 to 1995, between 1995 and 2002, employment status became the largest disequalizer, and the decline of inter-provincial inequality contributed to a reduction in entire earnings inequality. Individual ability, represented by education and occupation, received much greater rewards. Throughout the period from 1988 to 2002, a large part of the explained inequality increase was due to change in price (valuation of each individual's attributes) and not due to change in quantity (composition of individual attributes).

Keywords: urban China, earnings inequality, inequality decomposition
JEL classification: D31, J31

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Changes in the Causes of Earnings Inequality in Urban China from 1988 to 2002[*]

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October 2008 (Revised in June 2009)

Abstract

This paper analyzes the causes of earnings inequality in urban China from 1988 to 2002. Earnings inequality in urban China continuously increased, even when adjusting for regional price differences. This paper reveals how the causes of earnings inequality changed between the periods 1988-1995 and 1995-2002 by reflecting labor-related institutional reform in China. Contrary to the situation from 1988 to 1995, between 1995 and 2002, employment status became the largest disequalizer, and the decline of inter-provincial inequality contributed to a reduction in entire earnings inequality. Individual ability, represented by education and occupation, received much greater rewards. Throughout the period from 1988 to 2002, a large part of the explained inequality increase was due to change in price (valuation of each individual's attributes) and not due to change in quantity (composition of individual attributes).

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1. Introduction

As shown in this paper, as well as in many other studies, earnings inequality in urban China has been continuously increasing under China's economic reform. However, real earnings increased in all groups, including the lowest-income group (See Figure 1). Considering these findings, the question can be asked: Is the rise in earnings inequality problematic? Indeed, the rise may be problematic if it hinders China's economic efficiency by creating labor market segmentation, and if it systematically generates unequal earnings opportunities. Too large an inequality in earnings may also lead to social unrest. However, at the same time, growth in earnings inequality can be considered evidence of an improvement in economic efficiency in China as its market mechanism is still developing. In order to evaluate whether the rise in earnings inequality is "good" or "bad" for the economic development of China, or which parts are "good" and which parts are "bad," it is necessary to carefully examine the factors that have contributed to the inequality and to what degree. Only after such a careful assessment can an appropriate policy prescription for earnings inequality in China be possible.

Along with China's economic reform and transformation from egalitarian planned socialism to "market socialism," earnings distribution and earnings inequality in China became an interesting and important issue for both Chinese and international researchers, and Chinese policy makers. Such increased attention to earnings distribution in China led to a large international research project called the "Chinese Household Income Project (CHIP)," which was conducted in 1988, 1995, and 2002. As described in a later section, CHIP is the most comprehensive income survey in China, covering nationwide households with various kinds of income sources and various household attributes and members. By using the CHIP data (sometimes supplemented by other official Chinese national surveys), comprehensive studies have been carried out on earnings distribution and its inequality in China at the household and individual level (Griffin & Zhao, 1993; Khan & Riskin, 2001; Riskin, Zhao, & Li, 2001; Knight & Song, 2005; Gustaffson, Li, & Sicular, 2008).

By using province-level or sub-province-level data, regional inequality in China has also been examined by many researchers (For example, for recent studies, see Kanbur & Zhang, 2005; Wan, Lu, & Chen, 2007; Tsui, 2007). However, as Okushima and Uchimura (2006) claim, major studies on earnings inequality in China have focused more on rural or regional (e.g. rural-urban) inequality issues than on urban inequality issues.

This paper therefore aims to analyze the causes of earnings inequality in urban China from 1988 to 2002 by examining individual samples of urban Chinese residents drawn from the 1988, 1995, and 2002 CHIP data. I examine the degree to which institutional factors (i.e. labor market segmentation by province, employment status, industry, and ownership, and labor market discrimination by sex, minority status, and Communist Party membership) and human capital factors (i.e. education, experience, and occupation) contributed to the earnings inequality (both the level and its increase) in urban China from 1988 to 2002. Knight and Song (2005) and Okushima and Uchimura (2006) have previously analyzed the causes of earnings inequality in urban China in 1988 and 1995 by using the regression-based inequality method, which I have also applied to my analysis. However, by examining the 2002 data, this paper reveals how the causes of earnings inequality changed between the two periods 1988-1995 and 1995-2002 by reflecting labor-related institutional reform in China.[1] Contrary to the situation from 1988 to 1995, between 1995 and 2002, employment status became the largest disequalizer, and the decline of inter-provincial inequality contributed to a reduction in the overall earnings inequality. Individual ability, represented by education and occupation, received much greater rewards.

In addition to analyzing the recent trend to 2002, this paper contributes to the existing inequality decomposition literature on urban China in the following aspects: First, this paper measures earnings inequality in terms of the purchasing power of workers by adjusting price differences across provinces. By adjusting regional price differences (RPD), I show that in the

[1] After completing my analysis, I found Knight and Song (2008) who extended their previous inequality decomposition analysis to the year 2002. However, my analysis still differs from their study in terms of 1) adjusting for regional price differences, 2) examining employment status as a cause of inequality, 3) decomposing the inequality increase further into price and quantity effects.

existing literature, the level of earnings inequality in urban China and the contribution of the province to it have been overstated, while the contribution of other factors have been understated. Second, this paper analyzes the causes of earnings inequality in urban China in more detail, by examining the degree to which the contribution of each factor to the inequality change was due to price change (changes in the valuation of each individual's attributes) and quantity change (changes in the composition of individual attributes). It turns out that for both periods, 1988-1995 and 1995-2002, 75-90 percent of the explained inequality increase was due to price change and not due to quantity change.

This paper is organized as follows: Section 2 describes the data I use in my analysis. Section 3 describes the empirical strategy, including inequality measures used, and inequality decomposition method. Section 4 first describes to what extent, in the existing literature, regional price differences (RPD) have inflated the overall earnings inequality level in urban China as well as the contribution of the province to the inequality. Second, it decomposes the RPD-adjusted earnings into various institutional and human capital factors. It also decomposes the contribution of each factor to rising inequality into price effect and quantity effect. Section 5 shows that the changes in the causes of earnings inequality in urban China in the periods 1988-1995 and 1995-2002 primarily reflected the labor-related institutional reforms which occurred during those periods. Finally, Section 6 summarizes the findings of this paper. Additionally, the areas for future research are discussed.

2. Data Description

2.1 Data

My analysis uses individual samples of urban Chinese residents drawn from the survey named the Chinese Household Income Project (CHIP) or CASS survey for 1988, 1995, and 2002 (Griffin & Zhao, 1993; Riskin, Zhao, & Li, 2000; RCIDP).[2] CHIP is conducted by an

[2] I acknowledge the Research Center for Income Distribution and Poverty (RCIDP), Beijing Normal University (BNU), and the Inter-university Consortium for Political and Social Research (ICPSR) which

international group of economists with the Economics Institute of the Chinese Academy of Social Sciences (CASS) in order "to estimate the household income and its distribution in China according to standard international definitions" (Khan & Riskin, 1998). According to Khan and Riskin (2005), the CHIP surveys "still remain the only available source of (almost) nation-wide household-level data on income and other individual and household characteristics in China" and "provide the only comprehensive data base for the application of an income definition that helps overcome the limitations of the official definition underlying the published income data in China." Detailed information about CHIP and an overview of China's household income and its distribution in each survey can be found in Khan, Griffin, Riskin, and Zhao (1992), Khan and Riskin (1998), and Khan and Riskin (2005).

I used only urban individual samples drawn from all three CHIP datasets. My sample includes only working or employed individuals who are age 16 or above, are reporting positive earnings, and are living in the urban areas of ten provinces, namely, Beijing, Shanxi, Liaoning, Jiangsu, Anhui, Henan, Hubei, Guangdong, Yunnan, and Gansu. These provinces were selected in the CHIP survey to represent the entire urban Chinese population.[3] My sample largely excludes rural-urban migrants who have rural registration (*hukou*) but are living in urban areas.[4]

Earnings are defined as an annual wage including bonuses and subsidies from the primary work unit. When constructing the earnings based on this definition, I followed the income definition of the CHIP survey and used "UY1: Wage and salary: Cash income of the working members or wage" and subtracted income from the second job from UY1. When some earnings components were missing, I first dropped observations if the regular wage (in 1988) or

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distribute the CHIP datasets and who allowed me to use the datasets for my analysis.

[3] "Liaoning and Shanxi provinces were chosen to represent the north. Jiangsu and Guangdong represent the eastern coastal provinces, while Anhui, Henan and Hubei the interior and Gansu and Yunnan represent the west. Beijing represents the three large province-level municipalities." (Eichen & Ming, 1993).

[4] Only in the 2002 CHIP questionnaire, there is a question about *hukou* status. The result reveals that some urban residents actually have rural *hukou*. According to Appleton and Song (2008), they were included "because of their purchase of urban temporary status". In fact, my CHIP 2002 sample includes 83 workers having rural *hukou*. However, the proportion of them is very small (1.0%) and does not affect the essence of this paper. Using the sample excluding those rural-*hukou* workers does not change the inequality indices and regression-based decomposition results largely.

wage including bonuses and subsidies (in 1995 and 2002) was missing, then replaced missing values of other related income components with zero, and constructed a "UY1 minus second job income."[5] After that, individuals who earned non-positive earnings were also dropped. All the annual earnings are first adjusted in 1988 yuan prices by using the Urban General Price Index, which is identical for all provinces. I also adjusted the earnings by the 1988 Beijing price, taking into consideration the regional price (or living cost) differences. (For more detail, see Sections 3 and 4.) In the decomposition analysis, all earnings are expressed in logarithmic form following the form of the common earnings equation.

In the 1988 CHIP survey, there are questions about educational level, but no questions about years of schooling and experience. I have thus substituted the estimated years of schooling used in Knight and Li (1993, p.291) for each educational level category, and estimated years of experience as [age-years of schooling-6]. I have also estimated years of experience similarly for the 1995 or 2002 CHIP data, if the corresponding data were missing. After all observations in which there are missing values for variables used in the analysis were dropped, the final sample size becomes 17,085 for 1988, 9,477 for 1995, and 8,077 for 2002.

2.2 Summary statistics

Table 1 presents the summary statistics (number of observations, proportion of each category, and mean of annual earnings expressed in 1988 urban yuan prices and RPD-adjusted 1988 Beijing yuan prices) of variables used in the decomposition analysis.

They reveal some remarkable compositional changes between 1988 and 2002, such as: 1) a significant proportional increase in highly-educated workers, 2) a proportional decline in

[5] An alternative treatment for the missing values of income components other than regular wage would be to replace them with some average income such as the county or provincial average income. However, since about 60-90 % of the many related income components were missing in the 1988 and 1995 samples, replacing them with some average income may also create as many errors as simply replacing them with zero. The choice of average income (e.g. average income of province, educational group, occupation, and so on) may be arbitrary and problematic because it arbitrarily changes the contribution of a certain factor in the inequality decomposition. Thus, I have chosen to replace the missing values of income components other than the regular wage with zero.

state-owned and collective units and an increase in private or individual enterprises and self-employed workers, 3) a decline in the manufacturing industry especially from 1995 to 2002, and 4) a decline in permanent or long-term contract workers and an increase in temporary or short-term contract workers, private enterprise proprietors or self-employed workers, and workers who are employed without contract. For each variable, a more detailed examination is presented below.

Sex: The proportion of males is always greater than females and the proportion of males increased from 1988 to 2002. Males consistently received higher earnings than females.

Minority status and Communist Party membership: In all periods, about 5% report being of minority ethnic origin. The proportion of workers who are members of the Communist Party (CP) was about 25% in 1988 and 1995, while it was 30% in 2002. CP members consistently receive higher earnings than non-members.

Age and experience: Age and experience are not reported in Table 1. The mean age rose from 1988 to 2002. It was 37.1 years in 1988, 38.4 in 1995, and 40.5 in 2002. Estimated mean years of experience were 20.3 years in 1988, 19.3 in 1995, and 20.4 in 2002.

Educational level: From 1988 to 2002, the educational level of the sample became substantially higher. The proportion of workers with a college education or above (edu1) increased from 6.3% in 1988 to 10.9% in 2002. So did workers with professional school education (edu2), which rose from 6.8% to 24.0%, and those with middle level professional, technical or vocational, and upper middle school education (edu3) rose from 36.2% to 41.2%. In contrast, the proportion of workers with a lower level of education declined. The proportion of lower middle school graduates (edu4) decreased from 38.7% in 1988 to 21.7% in 2002. The proportion of workers with an elementary school and lower educational level (edu5) decreased from 12.0% to 2.2%. The earnings gap among education groups continuously increased.

Occupation: The proportion of professional or technical workers (occ2) increased most notably between 1988 and 1995 (from 16.1% to 22.1%). In contrast, the proportion of laborers and others (occ5) including salesclerks or service workers (which are mentioned as a separate

category in the CHIP 2002 questionnaire) declined, especially between 1988 and 1995 (from 52.9% to 43.8%).

Industry: The proportion of manufacturing (ind2) decreased dramatically between 1995 and 2002 from 41.1% to 25.2%. The proportion of commerce and restaurants, etc. (ind6) also decreased from 14.4% in 1995 to 10.2% in 2002. These two industries received relatively low earnings in all three years. In contrast, the proportion of real estate, public utilities, personal, consulting, and social services (ind7) increased greatly from 3.9% in 1995 to 14.2% in 2002. The proportion of health, physical culture, and social welfare (ind8), education, culture, and arts (ind9), finance and insurance (ind11), government, Party, and social organizations (ind12) increased slightly.

Ownership: The proportion of state-owned and local publicly-owned units (own1), and urban collectives (own2) declined significantly from 1988 to 2002 (own1: from 79.1% in 1988 to 66.6% in 2002, and own2: from 20.1% to 7.5 %), although the proportional increase in own1 in 1995 seems anomalous.[6] In contrast, the proportion of private or individual enterprises, and self-employed (own2) increased significantly, especially between 1995 and 2002 (0.4% in 1995 to 9.5% in 2002). The proportion of Sino-foreign joint ventures (own4) and foreign-owned firms (own5) increased slightly. Other ownership (own6) includes township and village enterprises, share-holding companies, and so on. Individuals working in foreign-owned firms earned a much higher salary in 1995 and 2002, although the sample size is small and may not be representative of the entire population of urban Chinese workers employed by foreign-owned units (most notably in 1995).

Employment status: The composition of employment status in urban China changed dramatically from 1988 to 2002, particularly between 1995 and 2002; the proportion of

[6] The 2002 CHIP questionnaire first asked about the types of current work unit (enterprise, government agency, institution, or others) and then asked about the ownership of the work unit only if the respondent was working in an enterprise. Since about 2,700 people responded as working in government agency or institution, I merged them with the own1 category. This treatment may not be accurate, but is reasonable since 96.5% of people working in government agencies or institutions answered that the ownership of their work unit is own1 in the 1995 CHIP.

permanent and long-term contract workers declined during this time period. In 1988, almost all workers (98.2%) were working as permanent or long-term contract workers (emp1). In 1995, 96.5% of the workers remained in that category. However, in 2002, only 76.9% of workers had the emp1 status, and the proportion of temporary and short-term contract workers (emp2) increased greatly from 2.5% in 1995 to 11.2% in 2002. The proportion of private enterprise proprietors or self-employed (emp3) and other statuses (emp4, who were mainly workers employed without contract in 2002) also increased. This change seems to reflect institutional changes that have occurred in China's urban labor market since the mid-1990s, as I will mention in Section 5. The earnings gap between emp1 and other employment status categories also expanded between 1995 and 2002.

Province: In my CHIP sample, the Beijing proportion increased from 4.9% in 1988, to 7.7% in 1995, and to 9.8% in 2002. Compared with the provincial composition of China's total urban employment drawn from the China Labour Statistical Yearbook, my sample seems to overrepresent some inland provinces such as Yunnan, Shanxi, and Gansu, while it underrepresents coastal provinces such as Guangdong and Liaoning. This is due not to the sample selection method mentioned in the previous section, but to the provincial composition of the original CHIP sample.

3. Empirical Strategy: Measuring and Decomposing Inequality

3.1 Inequality measures used in this analysis

Judging to what degree earnings inequality exists depends on what inequality measure we use. This analysis focuses on relative inequality, not absolute inequality. Relative inequality measures satisfy the income homogeneity, or scale independence property, which considers that the level of inequality does not change when everyone's income is multiplied by the same number. In contrast, absolute inequality measures observe that inequality has increased in such situations because the income gap between the rich and the poor has enlarged in terms of

absolute currency values. As Fields (2001) states, since it is empirically known that absolute inequality almost always increases during economic growth, it is more interesting to examine changes in relative earnings inequality in urban China, which experienced rapid economic growth from 1988 to 2002. Analyzing relative inequality is also more common in inequality literature (Fields, 2001, p.16).

Among the various relative inequality measures, the Gini coefficient, the Theil entropy measure, the ratio of 90th to 10th percentile (90/10 ratio), and similarly 50/10, 90/50, 75/25, and 95/5 ratios, and log-variance (the variance of the logarithms of earnings) are used in most of the analyses in this paper. Among those measures, I primarily examine the Gini coefficient and sometimes examine log-variance and the 90/10 ratio. The Gini coefficient and Theil entropy measure are both strongly Lorenz-consistent, although the Gini coefficient is more commonly used in the literature. Despite the fact that log-variance is Lorenz-inconsistent and is somewhat problematical, as Foster and Ok (1999) state, I use log-variance in order to decompose inequality into price and quantity effects.[7] Since, as we will see later, the contributions of some factors to inequality changes tend to be much greater than 100% in the Gini coefficient, but not in the log-variance, using log-variance sometimes makes it easier to see the overall features of the decomposition results. 90/10 ratio and other percentile ratio measures are weakly Lorenz-consistent. Among them, the 90/10 ratio is most commonly used in inequality analysis and can be a good alternative inequality measure for the Gini coefficient. (For the Lorenz-consistency of inequality measures, see Fields, 2001, pp.30-33. For more details on inequality measures, see Chapter 2 of Fields, 2001.)

3.2 Calculating RPD's contribution to unadjusted earnings inequality

I argue that earnings inequality should be measured in terms of worker purchasing

[7] Log-variance is Lorenz-inconsistent because it does not satisfy the transfer principle, and thus "certain transfers from someone relatively rich to someone relatively poor may increase the log-variance" (Fields, 2001, p.31). Foster and Ok (1999) showed that in the "worst-case scenario" it is possible that the log-variance concludes that the extreme inequality represented by an almost L-shaped Lorenz curve is more equal than the extreme equality represented by a Lorenz curve that is almost on the 45° line.

power and reflect the cost of living in each region. In Section 4, I will show the extent to which, in the existing literature, regional price differences (RPD) have inflated the overall earnings inequality level in urban China as well as the contribution of the province to the inequality. For such an examination, individual annual earnings are adjusted for regional price differences (RPD) by using the spatial price deflators developed by Brandt and Holz (2004). Their deflators were computed by constructing provincial-level living expenditure baskets in order to adjust the provincial purchasing power differences over time. In my analysis, RPD adjustment was carried out based on the 1988 Beijing price level. Unadjusted earnings were adjusted by the General Price Index of Urban Areas, as in the existing literature, and they are based on the 1988 price level.

The contribution of RPD to the unadjusted earnings level and its change is then calculated by the following equation.

$$RPDeffect = [1 - (I(.)_{RPD} / I(.)_{noRPD})] * 100(\%)$$

where $RPDeffect$: RPD's contribution to unadjusted earnings inequality level or its change,

$I(.)_{RPD}$: Inequality index (for inequality level or inequality change) computed based on RPD-adjusted earnings, and

$I(.)_{noRPD}$: Inequality index (for inequality level or inequality change) computed based on unadjusted earnings.

3.3 Decomposing earning inequality: Regression-based approach

In order to decompose the level and its change in earnings inequality in urban China from 1988 to 2002, I applied the regression-based decomposition method, which is proposed and comprehensively explained in Fields (2002). As Fields states, this regression-based decomposition method has some advantages. It is compatible with the regression analysis by running a standard semi-log income-generating function. Also, in the level decomposition, the magnitude of each factor's contribution does not change regardless of the inequality measure used.

Following Fields (2002), I first ran an ordinary least squares (OLS) regression by fitting a standard semi-log earnings-generating function separately for each year (1988, 1995, and 2002). In order to compare the results, two dependent variables were used: one is RPD-adjusted log earnings and the other is unadjusted log earnings. The explanatory variables used in all equations are sex (sex), minority status (min), Communist Party membership (cp), years of experience and years of experience squared (exp), educational level (edu), occupation (occ), ownership (own), industry (ind), employment status (emp), and province (prov).[8] Following the classification of Knight and Song (2005), sex, minority status, and Communist Party membership are considered to be "discrimination" variables which indicate the existence of discrimination in the labor market. Ownership, industry, employment status, and province are considered to be labor market "segmentation" variables.[9] I classify both discrimination variables and labor market segmentation variables as institutional factors. Education, experience and occupation are classified as human capital factors.

The regression equation can be simply expressed as follows.

$$\ln Y_{it} = \alpha_t + \sum_j \beta_{jt} Z_{ijt} + \varepsilon_t$$

where subscripts *i* and *t* indicate individual and time period (1988, 1995, or 2002), respectively. $\ln Y_{it}$ is the logarithm of earnings, α_t is the estimated constant term, Z_{ijt} is the *j*'th explanatory variable, β_{jt} is the estimated coefficient for the *j*'th explanatory variable, and ε_t is the residual.

The above equation can be rewritten as

$$\ln Y_{it} = a_t' Z_{it}$$

where $a_t = [\alpha_t \ \beta_{1t} \ \beta_{2t} \ldots \beta_{Jt} \ \ 1]$ represents the estimated coefficient vectors, and

$Z_{it} = [1 \ \ x_{i1t} \ x_{i2t} \ldots x_{iJt} \ \ \varepsilon_{it}]$ represents the constant, *J* explanatory variables, and the residual.

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[8] The number of categories in each variable is 2 (sex), 2 (min), 2 (cp), 5 (edu), 5 (occ), 6 (own), 13 (ind), 4 (emp), and 10 (prov). For details, please refer to Table 1.

[9] Knight and Song (2005) did not include industry and employment status as decomposers. As a result, they only included ownership and province as "segmentation" variables.

$s_j(\ln Y)$, the contribution of the *j*'th factor to the inequality level of ln*Y* in a certain period (subscript *t* is omitted) can then be calculated as follows:

Contribution of the j'th factor to the inequality level of lnY

$$s_j(\ln Y) = \text{cov}[a_j Z_j, \ln Y] / \sigma^2(\ln Y) = a_j * \sigma(Z_j) * cor[Z_j, \ln Y] / \sigma(\ln Y)$$

where σ^2, σ, and *cor* stand for variance, standard error, and correlation, respectively. $\sum_{j=1}^{J+2} s_j(\ln Y) = 100\%$, and $\sum_{j=1}^{J+1} s_j(\ln Y) = R^2(\ln Y)$, where R^2 stands for R-squared which represents the overall percentage explained by the explanatory variables (Fields 2002, Equations (8.a-d)).

Next, the contribution of the *j*'th factor to the change in an inequality measure *I*(.), such as the Gini coefficient, 90/10 ratio, and log-variance, between time 1 and time 2 can be calculated as follows:

Contribution of the j'th factor to the change in an inequality measure between time 1 and time 2

$$\Pi_j(I(.)) = [s_{j,2} * I(.)_2 - s_{j,1} * I(.)_1] / [I(.)_2 - I(.)_1]$$

where $I(.)_t$ represents an inequality measure calculated at time *t* (*t* = 1 or 2), and $s_{j,t}$ represents the contribution of the *j*'th factor to the inequality level of ln*Y* at time *t* (Fields 2002, Equation (17.b)).

Unlike level decomposition, where the value of $s_j(\ln Y)$ does not depend on the inequality measure used, the value of $\Pi_j(I(.))$ does depend on which inequality measure is used.

3.4 Decomposing inequality change into price and quantity effects

I will also decompose the contribution of each factor to the inequality change into price and quantity effects, following the method described by Fields (2002), which also referred to the works of Yun (2002) and Juhn, Murphy, and Pierce (1993).

First, two actual log earnings distributions (in my analysis, actual RPD-adjusted log earnings) at time 1 and 2 are expressed as follows, respectively.

$\ln Y_{i,1} = a_1' Z_{i,1}$ (Actual log earnings distribution at time 1)

$\ln Y_{i,2} = a_2' Z_{i,2}$ (Actual log earnings distribution at time 2)

Next, the following auxiliary log earnings distribution, which uses the prices of distribution at time 1 and the quantities and residual of distribution at time 2, is generated.

$$\ln Y_{i,aux} = a_1' Z_{i,2}$$

The variance of $\ln Y_{aux}$ is then expressed as

$$\sigma^2(\ln Y_{aux}) = \sum_j a_{j1}\sigma(Z_{j2})cor(Z_{j2}, \ln Y_{aux})\sigma(\ln Y_{aux})$$

(Fields, 2002, Equation (23))

The inequality change between time 1 and time 2 can be decomposed as

$$I_2 - I_1 = (I_2 - I_{aux}) + (I_{aux} - I_1)$$

where the first term represents the price effect and the second term represents the quantity effect.

Using log-variance as the inequality measure I (.), the above equation becomes

$$\begin{aligned}
&\sigma^2(\ln Y_2) - \sigma^2(\ln Y_1) \\
&= \sum_j [a_{j2}\sigma(Z_{j2})cor(Z_{j2}, \ln Y_2)\sigma(\ln Y_2) - a_{j1}\sigma(Z_{j2})cor(Z_{j2}, \ln Y_{aux})\sigma(\ln Y_{aux})] \\
&+ \sum_j [a_{j1}\sigma(Z_{j2})cor(Z_{j2}, \ln Y_{aux})\sigma(\ln Y_{aux}) - a_{j1}\sigma(Z_{j1})cor(Z_{j1}, \ln Y_1)\sigma(\ln Y_1)]
\end{aligned}$$

(Fields, 2002, Equation (25))

The weights of price and quantity effects within each *j*'th factor can then be calculated by the following equation, where the first and second term on the right hand side represents the price effect and the quantity effect, respectively.

$$1 = \frac{[a_{j2}\sigma(Z_{j2})cor(Z_{j2}, \ln Y_2)\sigma(\ln Y_2) - a_{j1}\sigma(Z_{j2})cor(Z_{j2}, \ln Y_{aux})\sigma(\ln Y_{aux})]}{s_j(\ln Y_2) - s_j(\ln Y_1)}$$

$$+ \frac{[a_{j1}\sigma(Z_{j2})cor(Z_{j2}, \ln Y_{aux})\sigma(\ln Y_{aux}) - a_{j1}\sigma(Z_{j1})cor(Z_{j1}, \ln Y_1)\sigma(\ln Y_1)]}{s_j(\ln Y_2) - s_j(\ln Y_1)}$$

(Fields, 2002, Equation (26))

4. Results

4.1 Inequality of RPD-adjusted and unadjusted earnings

Earnings inequality in urban China continuously increased in terms of both RPD-adjusted and unadjusted earnings. Figure 2 and Figure 3 clearly show that a Lorenz-worsening occurred in urban China from 1988 to 1995 and from 1995 to 2002 in terms of both types of earnings. As shown in Table 2, Lorenz-worsening leads to an increase in all Lorenz-consistent inequality indices, such as the Gini coefficient, Theil entropy measure, and 90/10 ratio (or 50/10, 90/50, 75/25, and 95/5 ratio). Although log-variance is not Lorenz-consistent, inequality also increased in terms of log-variance. Table 2 also shows that for all indices, the inequality levels based on RPD-adjusted earnings are smaller than those based on unadjusted earnings, which have usually been used in analyses in the existing literature. For example, the Gini coefficient based on RPD-adjusted earnings is 0.233 (1988), 0.278 (1995), and 0.330 (2002) respectively, while it is 0.245 (1988), 0.300 (1995), and 0.348 (2002) based on unadjusted earnings. This fact illustrates that RPD has inflated the overall earnings inequality level in urban China in the existing literature.

4.2 Contribution of RPD to the inequality of unadjusted earnings

Table 3 reports on the degree of contributions of RPD to inequality levels based on unadjusted earnings and their changes over time. As Table 3 shows, if we measure the inequality by the Gini coefficient, RPD accounts for 4.8% of the inequality level of unadjusted earnings in 1988, 7.1% in 1995, and 5.0% in 2002. With regard to the inequality change over time, RPD contributed to the inequality increase between 1988 and 1995 (accounting for 17.4% of the increase in the Gini coefficient), while it contributed to a reduction in inequality between 1995 and 2002 (-7.8%)

Table 4 presents the result of inequality decomposition for both RPD-adjusted and unadjusted earnings. It is clear from Table 4 that the relative importance of the province on the earnings inequality becomes much smaller for RPD-adjusted earnings than for unadjusted

earnings. For example, the province accounted for 8.3% of unadjusted earnings inequality in 1988, 17.1% in 1995, and 8.6% in 2002, while it only accounted for 2.1% of RPD-adjusted earnings in 1988, 9.4% in 1995, and 4.1% in 2002.[10] Due to the decline of the province effect, the relative contribution of other factors becomes larger for RPD-adjusted earnings.

This occurs because the RPD adjustment resulted in a decrease in the level of inter-provincial inequality in all three periods. If we calculate the coefficient of variation (CV) of the unadjusted and RPD-adjusted mean earnings of ten provinces, CV is much smaller in RPD-adjusted earnings.[11] The CV of mean RPD-adjusted earnings of ten provinces (CV_{RPD}) is 0.072, 56% smaller than that of unadjusted earnings (0.163, CV_{noRPD}) in 1988. Similarly, CV_{RPD} is 0.227, 33% smaller than CV_{noRPD} (0.338) in 1995, and 0.170, 40% smaller than CV_{noRPD} (0.282) in 2002. Since inter-provincial inequality decreased, and thus the absolute contribution of the province to the overall inequality decreased, the relative contribution of other factors increased.

The above results are fairly consistent with the result of Démurger, Fournier, and Li (2006), except that this analysis shows that RPD contributed to a reduction in inter-provincial inequality from 1995 to 2002 while Démurger et al. found that RPD contributed to a slight increase in inter-provincial inequality.[12] This may be due to the differences in income definition between the two analyses. While this analysis is based on individual earnings, the analysis of Démurger et al. (2006) is based on household disposable income, which includes more income

[10] If we set "total explained" as 100%, where [total explained = 100% - residual contribution] as in the subsequent decomposition analysis, the province accounted for 19.0% of unadjusted earnings inequality in 1988, 41.4% in 1995, and 23.2% in 2002, while it accounted for only 5.3% of RPD-adjusted earnings in 1988, 26.4% in 1995, and 12.2% in 2002.

[11] The coefficient of variation (CV) is the standard deviation divided by the mean. CV is useful since it is scale independent, unlike variance and standard deviation. In fact, CV is also Lorenz-consistent.

[12] Using the CHIP data from 1988, 1995, and 2002, Démurger et al. (2006) have already discussed the extent to which RPD inflated the overall income inequality in urban China measured in terms of household total disposable income. They found that overall inequality in urban China from 1988 to 2002 was 7-20% higher for the RPD-unadjusted income compared to that in the RPD-adjusted income. By applying the standard inequality decomposition by sub-groups, they also showed that the use of RPD-unadjusted income overstated the contribution of inter-provincial inequality to overall inequality levels and inequality changes between 1988 and 1995, while it did not influence the contribution of inter-provincial inequality between 1995 and 2002.

components than the current analysis. Similar to Démurger et al. (2006), the above result suggests that in the existing literature, the level of earnings inequality in urban China, and the contribution of the province to it, have been overstated. In addition, the contributions of other factors were understated (except for the inequality increase from 1995 to 2002) in the inequality decomposition literature. Showing the degree to which RPD adjustment changes the entire decomposition result or the relative importance of the province and other various factors is the contribution to the existing literature of this analysis.[13]

Since it seems more appropriate to measure the "real" earnings inequality in terms of worker purchasing power, the RPD-adjusted earnings are examined and decomposed in the following analysis.

4.3 Decomposing RPD-adjusted earnings inequality into institutional and human capital factors

4.3.1 Decomposing earnings inequality level

Table 5 reports the decomposition result of the earnings inequality level without the residual. In contrast to Table 4, in Table 5, the contribution of each factor is calculated by setting "total explained" as 100%, where total explained = R-squared = 100% - residual contribution. It should be kept in mind that the total percentages explained by the explanatory variables are not so large, and that in all three years the residual was the largest factor, and its contribution increased gradually (60.3%, 64.4%, 66.0%) in each of the years indicated. Residual contribution can be calculated by [100% - total explained] in Table 5 or seen from the "residual" line in Table 4. The regression result for each year is presented in the Appendix.

As can be seen from Table 5, the relative magnitude of the contributions of some factors changed substantially over the three periods. In both 1988 and 1995, the largest contributor

[13] The inequality decomposition by sub-groups used in Démurger et al. (2006) does not make it possible to examine the degree to which the relative importance of the province compared to changes in other factors (e.g. education, occupation, employment status) due to the RPD adjustment, while the regression-based decomposition used in this analysis does.

(excluding residual) to the earnings inequality level was experience (64.8% in 1988 and 35.5% in 1995), while, in 2002, it was employment status (27.6%), and the contribution of experience became much smaller (10.1%). The contributions of employment status, education, occupation, and industry, to the earnings inequality level increased continuously from 1988 to 1995 and from 1995 to 2002 (education: 5.1%, 8.6%, 16.9%; occupation: 5.6%, 7.7%, 12.3%; industry: -0.8%, 3.7%, 7.9%, respectively). By contrast, the contributions of experience, sex, and Communist Party (CP) membership decreased between 1988 and 1995 and between 1995 and 2002 (experience: 64.8%, 35.5%, 10.1%, sex: 5.5%, 4.7%, 4.9%, CP membership: 4.2%, 3.6%, 2.1%). The contribution of the province remained relatively large, especially for 1995 and 2002, even though RPD was adjusted (26.4% in 1995 and 12.2% in 2002). Ownership consistently accounted for about 6 to 8 percent of the inequality level. Minority status contributed essentially nothing in all three periods.

4.3.2 Decomposing earnings inequality increase

Table 6 presents the decomposition results of the earnings inequality increase from 1988 to 1995 and from 1995 to 2002. In a similar manner to the construction of Table 5, the contribution of each factor is calculated by setting "total explained" as 100%, where total explained = 100% - residual contribution. Again, it should be noted that the total percentages explained by the explanatory variables are not large, and that in both periods the residual was the largest factor, although its contribution decreased. The residual contribution to the earnings inequality increase was about 70-90 % for 1988-1995, and about 70-80% for 1995-2002. (The magnitude depends on which inequality measure is used, and the residual contribution can be calculated by [100% - total explained] in Table 6).

In a similar manner to the level decomposition, the relative importance of some factors changed significantly between the two periods. The main contributors to inequality increase from 1988 to 1995 were the province (322.6% measured by the Gini coefficient), industry (66.0%), education (56.8%), occupation (37.1%), and ownership (24.7%), while the main

contributors to inequality decrease were experience (-374.8%) and employment status (-25.2%). From 1995 to 2002, the major disequalizing forces were employment status (219.3%), education (78.8%), occupation (47.1%), and industry (38.9%), and their contributions increased compared to those from 1988 to 1995. The contribution of sex also increased from -5.2% to 6.2%. From 1995 to 2002, the main equalizers were experience (-178.9%) and the province (-93.7%). Although the province contributed significantly to the inequality change in urban China during both periods, the direction of its contribution was reversed. In fact, as examined in the next section, inter-provincial inequality fell between 1995 and 2002 despite the overall urban inequality increase during that period. Ownership also contributed slightly to the equalization of earnings from 1995 to 2002 (-7.4%). CP membership contributed to a slight reduction in the inequality in both periods (-5.5% and -8.9%). Minority status disequalized the earnings distribution slightly (3.6%) from 1988 to 1995, while equalizing it slightly (-1.5%) from 1995 to 2002. The direction or sign of the contribution of each factor to earnings inequality is fairly consistent in all inequality measures. However, some inequality measures, such as log-variance, show an opposite direction to the Gini coefficient with regard to the contribution of CP membership and sex from 1988 to 1995 and ownership from 1995 to 2002.

4.4 Decomposing earnings inequality increase into price and quantity effects

In Table 7, the decomposition result of the inequality increase measured by log-variance is further decomposed into price and quantity effects. Table 7 clearly shows that a large part of the explained inequality increase was due to a price (coefficient) change in both periods and its contribution even increased from 76.9% in the period 1988-1995 to 94.4% in the period 1995-2002. Within the contribution of each factor, price effect is also generally much larger than quantity effect, which represents the change in the distribution of worker attributes. However, regarding the contribution of education, the quantity effect is much larger (71.2%) than the price effect (28.8%) between 1988 and 1995, suggesting that the compositional changes in worker educational level contributed to the inequality increase more than the changes in educational

earnings differentials did.[14] By contrast, between 1995 and 2002, the changes in educational earnings differential (price effect) contributed greatly to the inequality increase (107.6% of the contribution of education), while the compositional changes of worker educational level (quantity effect) worked as an equalizer (-7.6% of the contribution of education).

5. Discussion: Underlying Labor-related Institutional Reform in China

5.1 Comparison with the existing literature

The relative importance of each factor to the earnings inequality in urban China in 1988 and 1995, obtained from the above decomposition results, is generally consistent with the results of Knight and Song (2005) and Okushima and Uchimura (2006). They also decomposed the earnings inequality in urban China by examining the CHIP 1988 and 1995 data. However, it is difficult to compare the results of this study with their results due to different specifications.[15][16]

The major differences between the results of this study and these other studies are as follows: First, Knight and Song (2005), Okushima and Uchimura (2006), and Knight and Song (2008) did not include employment status as a decomposer. By including employment status, it

[14] However, the price effect of education between 1988 and 1995 is likely to be understated in my analysis, where the returns to education in 1988 are much larger than those in the literature, such as Knight and Song (2005) and Okushima and Uchimura (2006). This seems to be due to the treatment of missing income components in my analysis and the fewer educational categories.

[15] Knight and Song (2005) did not include industry and employment status as decomposers and used age instead of estimated experience. Their result shows that the two most important factors in the inequality level in 1988 and 1995 were age and province, although the contribution of age decreased while the contribution of the province increased. As a result, age became the largest equalizing force and the province became the largest disequalizing force for the inequality increase from 1988 to 1995 (Residuals excluded). The contribution of education and occupation increased from 1988 to 1995, and thus education and occupation became the second and the third largest contributors, respectively, to the inequality increase from 1988 to 1995. Discrimination variables such as sex, CP membership, and minority status only made slight contributions to the inequality increase.

[16] Okushima and Uchimura (2006) did not include minority status, employment status, and province in the decomposition of overall urban inequality. (Instead of including province as a decomposer, they presented the inequality decomposition result by province separately.) They also used age instead of experience. The contribution of age, education, and occupation showed trends similar to the results of Knight and Song (2005) and my own. Unlike the results found in my own work and the work by Knight and Song (2005), they found a greater contribution of sex to earnings inequality in 1995 and thus in the inequality increase from 1988 to 1995.

became possible to present a new and significant change in the decomposition result, i.e., the large contribution of employment status to inequality in 2002 and its increase from 1995 to 2002. Second, in my results, the contribution of the province is much smaller due to the RPD adjustment. As a result, the relative contributions of other factors are greater. Third, the estimated coefficients for education in 1988 are higher in my sample than in the results of the studies mentioned, and as a result, the contribution of education in 1988 is greater in my sample. However, on this point, it is possible that the returns to education in 1988 in my estimation are overstated due to the treatment of missing income components in my analysis and the smaller number of education categories. Fourth, the magnitude of the contribution of each factor to the inequality increase is much larger in my result.

Similar to previous studies, especially Knight and Song (2005), my decomposition results indicate that institutional factors, in particular labor market segmentation by employment status, province, industry, and ownership, and human capital factors (educational level, experience, and occupation) contributed significantly to the levels of and changes in earnings inequality in urban China from 1988 to 2002. However, the magnitude of the contributions of some factors changed substantially from 1988 to 2002, reflecting institutional changes which occurred in urban China during that period.

5.2 Labor-related institutional reform in China[17]

China's employment system began its transition from a planned system to a market system at the end of the 1970s. Under the planned system, wages were set by the government, jobs were assigned to graduates, and life-time employment was guaranteed in state-owned working units, which were the dominant employer. There was no labor "market." However, labor-related institutional reform began at the end of the 1970s, when China started to introduce market mechanisms. This reform introduced market mechanisms into the wage and employment

[17] For the details of labor-related institutional reform in China, I have mainly referred to Marukawa (2002) and Chapter 2 of Knight and Song (2005).

system in urban China. The Chinese labor "market" appears to be functioning better, especially since the mid-1990s, due to the 1994 Labor Law and the increase in worker lay-offs. Wages and labor mobility became more flexible and the wages seem to reflect true worker ability more appropriately. Along with the market-oriented economic reforms, employment status and ownership were also diversified and created earnings gaps. At the same time, incomplete and uneven marketization created a new labor market segmentation by province, industry, employment status, and ownership. Below, the results for inequality decomposition and the underlying institutional reform are analyzed in greater detail.

5.2.1 Introduction of market mechanisms

Under China's economic reforms, wage and labor mobility became more flexible and forms of employment more diversified. First, the Chinese government reformed the rigid wage system towards one that was more flexible and more linked to productivity. In the 1980s, the use of bonuses was expanded, the pay for performance mechanism was partly introduced in the early 1990s, and the linkage between salary and a firm's performance increased (Marukawa, 2002). The decomposition results in the previous section reflect this wage system change. It shows that the earnings premium for skills and abilities represented by education and occupation increased continuously from 1988 to 2002.

Education: The contribution of education to earnings inequality increased over time, and education became the second largest factor in 2002, accounting for 16.9% of the explained inequality level. Although a large part of the contribution of education is explained by the quantity effect (i.e. an increased proportion of highly educated workers) between 1988 and 1995, for the inequality increase between 1995 and 2002, 107.6% of the contribution due to education was explained by price change. In other words, increased earnings differentials among education groups contributed significantly to the inequality increase from 1995 to 2002, as seen from the regression result in the Appendix. For example, in 1995, annual earnings for the educational level "lower middle school" (edu4) and "elementary school and below" (edu5) were

lower by about 23% and 39%, respectively, compared to "college or above" (edu1). However, in 2002, these were lower by 46% and 53%, respectively.

Occupation: The contribution of occupation also increased over time, and occupation was the third largest contributor in 2002, accounting for 12.3% of the explained inequality level. Price effects were also dominant in both 1988 to 1995 and 1995 to 2002, indicating increased earnings differentials between different occupations. For example, in 2002, "owner and manager of private or individual enterprise, and self-employed" (occ1) had reduced relative earnings compared to "office worker" (occ4) by 48%, while occ1 increased relative earnings 0.1% in 1988 and 7% in 1995, although these were not statistically significant. This seems to be due to the increase in self-employed workers and their low earnings (In 2002, it became possible to separate occ1 into "owner and manager of private firms," and "self-employed workers." 82% of occ1 is self-employed workers and the mean RPD-adjusted earnings is 2,135 yuan for self-employed workers, while it is 5,759 yuan for private firm owners and managers).

Experience: As Appleton, Song, and Xia (2005) suggest, under the planned economy, earnings were once strongly linked with "experience" in terms of age or tenure in a firm and such "experience" did not necessarily indicate a worker's ability. Thus the decline in the experience premium can be seen as a tendency to give higher rewards for worker ability and performance.

Increasing returns to ability can be interpreted in two ways. The first interpretation is that, with the gradual marketization, the Chinese labor "market" has just recently gained the ability to evaluate the true ability of workers appropriately. During the planned economy era, high ability was undervalued while low ability was overvalued, as illustrated by seniority-based pay. The second interpretation is that, with the advent of a more flexible labor market, rapid economic development, and educational reform, which generated a more highly educated population, supply and demand shifts for skills influenced the earnings differentials among skill groups.[18] On this count, Asuyama (2008) examines the causes of widening earnings gaps

[18] Educational reform generated a more educated population. In 1998, the Chinese Ministry of Education

among education groups in more detail by introducing supply and demand shift effects.

Second, in addition to wage reform, the employment system was reformed to promote more labor mobility and the forms of employment became more diversified. Under China's economic reforms, life-time employment was no longer guaranteed. In the early 1980s, the labor contract system, which allowed employers to conclude a fixed-term contract with new recruits, was introduced experimentally. It was expanded for all newly hired state-owned-enterprise (SOE) workers in the mid-1980s (Marukawa, 2002; Knight & Song 2005). Finally, the 1994 Labor Law required the conclusion of a labor contract (either unfixed [permanent] or fixed-term contract) with all workers regardless of the firm's ownership. The deterioration in the SOEs' performance and the increased lay-off of workers in the late 1990s also contributed to ending China's life-time employment system (Marukawa, 2002).

Employment status: The decomposition result in the previous section clearly shows the end of life-time employment and the diversification of employment statuses, especially after the enforcement of the 1994 Labor Law. Employment status diversified from 1995 to 2002 in particular and accompanied the appearance of large earnings differentials between different employment statuses. As a result, employment status became the largest contributor to earnings inequality in 2002, accounting for 27.6% of the total explained inequality, although it contributed little in 1998 and in 1995 (3.6% and 1.7%, respectively). Consequently, it was the largest contributor to the inequality increase between 1995 and 2002, accounting for 67.2% of the log-variance increase. 17.1% of that contribution was due to the quantity effect and 82.9% was due to the price effect. As described in Section 2, between 1995 and 2002, the proportion of permanent and long-term contract workers (emp1) declined significantly (from 96.5% to 76.9%), and instead, the proportion of temporary and short-term contract workers (emp2), private enterprise proprietor or self-employed workers (emp3), and other workers including workers

promulgated *The Action Plan to Vitalize Education Facing the Twenty-first Century* which aims to expand the gross enrollment rate in higher education institutions to 11% by 2000 and 15% by 2010 (Pretorius & Xue, 2003). As a result, the number of graduates from regular institutions of higher education rapidly increased from 830,000 in 1998 to 3 million in 2005 (China Statistical Yearbook 2006).

employed without contract (emp4) increased (emp2: 2.5% to 11.2%, emp3: 0.3% to 3.1%, emp4: 0.7% to 8.8%). As seen from the regression results in the Appendix, the earnings differentials among these workers also increased. Estimated coefficients obtained from the regression indicate that emp2, emp3, and emp4 statuses saw earnings decrease by 30%, 70%, and 47%, respectively compared to emp1 in 2002, while these were only 13%, 3%, and 26% in 1995 (Note that coefficient for emp3 (3%) was not statistically significant).

Ownership: In addition to the diversification of employment status, firm ownership types also diversified. In the private sector, which expanded during the reforms, wages became more closely linked with worker productivity (Appleton, Song, & Xia, 2005). As described in Section 2, the proportion of state-owned and local publicly-owned units (own1) and urban collectives (own2) declined significantly from 1988 to 2002, while the proportion of private or individual enterprises and self-employed persons (own2) increased significantly, and that of Sino-foreign joint ventures (own4) and foreign-owned firms (own5) increased slightly. The regression results indicate that there were large earnings differentials between these different types of ownerships.

5.2.2 Segmentation of labor market

Since the marketization of the Chinese labor system was accompanied by a rapid and uneven industrialization, and the gradual marketization was incomplete and uneven, the Chinese urban labor market became segmented by province, industry, employment status, and ownership.

Province: First, the Chinese urban labor market is segmented by province. Although after the RPD adjustment, the contribution of the province to the inequality increased from 5.3% in 1988 to 26.4% in 1995, and substantially accounted for the inequality increase between 1988 and 1995 (322.6% as measured by the Gini coefficient). Due to the fall in inter-provincial inequality, the contribution of the province decreased in the period 1995 to 2002 and thus the province worked as an equalizing force from 1995 to 2002. However, the province still

remained one of the important disequalizing forces in 2002, accounting for 12.2% of the inequality level. Within the province effect, Shanxi, Gansu, and Guangdong especially contributed to the inequality increase from 1988 to 1995. For example, out of the total 322.6% contribution of the province to the increase in the Gini coefficient, Shanxi, Gansu, and Guangdong accounted for 105.0%, 77.4%, and 58.1% respectively. For the province's negative contribution of -93.7% to the inequality increase from 1995 to 2002, Guangdong still contributed to the earnings inequality increase (12.3%). However, Shanxi, Gansu, and Henan contributed to a reduction in inequality (-34.3%, -31.3%, and -26.5% respectively).

What caused this labor market segmentation by province? First, as in any other country, it is natural for labor mobility to be limited to the local region due to family ties, familiarity with the working environment and the local market, and so on. In addition, in urban China, some local city governments previously gave incentives to firms to hire workers from inside the city or directly restrict the hiring of workers from outside the city in certain occupations (Marukawa, 2002). It is well known that the urban registration (*hukou*) system created labor market segmentation between urban and rural workers, but labor mobility was also restricted even among urban *hukou* residents by these protectionist policies of local governments.

Second, the differences in labor demand across provinces, which also depend on economic growth and the speed of industrialization in each province, may have enlarged the real earnings differentials between provinces. For example, in Guangdong which achieved high economic growth by attracting foreign direct investment (FDI), RPD-adjusted earnings increased faster than in other provinces, and thus contributed to the inequality increase. By contrast, however, Shanxi and Gansu are relatively poor inland provinces and have received a very small amount of FDI. In fact, Wan, Lu, and Chen (2007) and Zhang and Zhang (2003) found that globalization, represented by trade and FDI, was the most important contributor to the rise of regional inequality in China by examining 1987-2001 and 1986-1991 data, respectively, and that its contribution increased during those periods. However, since inland provinces such as Shanxi, Gansu, and Henan continued to receive relatively small amounts of

FDI after 1995 compared with coastal provinces, such an explanation cannot explain the fall in inter-provincial inequality between 1995 and 2002.

The inter-provincial inequality (inequality between provinces) increased from 1988 to 1995 but decreased from 1995 to 2002 in urban China, while intra-provincial inequality (inequality within provinces) continuously increased by a larger magnitude from 1995 to 2002. As mentioned earlier, the coefficient of variation (CV) of the mean earnings of 10 provinces increased significantly from 0.072 in 1988 to 0.227 in 1995, but then declined to 0.170 in 2002. The relative earnings inequality between coastal and inland regions also fell in the period 1995 to 2002. This is shown by the fact that mean earnings grew faster in the inland region than in the coastal region in the period 1995 to 2002 (In 2002, mean earnings became 1.75 times larger than those in 1995 in the inland region, while becoming 1.60 times larger in the coastal region).[19] Intra-provincial inequality, represented by the Gini coefficient and log-variance, is presented in Table 8. It shows that in almost all provinces, inequality increased in both periods, 1988 to 1995 and 1995 to 2002, accelerating during the latter period.

By examining the per capita disposable urban household income computed from the CHIP 1995 and 2002 data, Khan and Riskin (2005) also found a decline in inter-provincial inequality and an increase in intra-provincial inequality in urban China from 1995 to 2002. The fall in inter-provincial inequality was also confirmed by the official Chinese statistics. Figure 4 presents the coefficient of variation (CV) of urban household per capita annual disposable income for the 10 provinces and for all 31 provinces, adjusted for RPD. The CV is computed based on the official Chinese statistics. The 10 provinces are the same as those used in my analysis and the 31 provinces include all provinces in urban China. Although the CV in 2002 appears to be notably smaller than in neighboring years, we can still see that the overall trend is for inter-provincial inequality to increase from the 1980s up to around 1995, and then decrease or remain almost the same since then. Although further research is needed, one possible

[19] Following Kanbur and Zhang (2005) and other previous studies, Beijing, Liaoning, Jiangsu, and Guangdong are classified as coastal region provinces and the remaining provinces, Shanxi, Anhui, Henan, Hubei, Yunnan, and Gansu are classified as inland region provinces.

explanation for the decline in inter-provincial inequality in urban China from 1995 to 2002 is that increased supply of migrant workers to the coastal provinces such as Beijing, Guangdong and Jiangsu suppressed the earnings of local low-skilled urban workers. Such a phenomenon would consequently cause the rise in mean earnings of those provinces to be relatively moderate. This hypothesis is also examined in Asuyama (2008).

Industry: The contribution of industry to inequality increased over time. Under rapid economic development, the proportion of manufacturing decreased and the service sector increased in urban China, as examined in Section 2. Such a rapid change may have increased the labor demand in some service sectors and decreased the labor demand in the manufacturing sector (the product demand shift across industries will be estimated in Asuyama (2008) and this speculation partly confirmed, especially from 1995 to 2002). The regression results in the Appendix show a remarkable structural change in earnings differentials by industry. In 1988, workers in many service industries received smaller earnings than those in manufacturing. However, in 2002, workers in many service industries received much higher earnings than those in manufacturing. Since it takes some time to acquire the new skills required for a new industry and to change jobs from old to new industries, a rapid industrial shift creates labor market segmentation by industry.

Employment status: As examined before, a segmented labor market by employment status also emerged. Labor market dualism between permanent or long-term contract workers who enjoy higher wages and job security, and temporary or short-term contract workers who receive lower wages and little job security, have also been seen in many other countries. (For OECD countries, see OECD, 2002.)

Ownership: Segmentation by ownership also seems to exist in urban China. Knight and Song (2005) show that the proportion of workers who moved from SOE jobs to other ownership types (16%) was much smaller than those who moved to another SOE (84%) in 1999.

6. Conclusions

6.1 Summary of the findings

This paper analyzed the causes of earnings inequality in urban China from 1988 to 2002. Individual samples from 1988, 1995, and 2002 of urban Chinese residents, drawn from the Chinese Household Income Project (CHIP) were used. My analysis contributes to the existing inequality decomposition literature on urban China by 1) measuring the earnings inequality in terms of the purchasing power of workers by adjusting for regional price differences (RPD), 2) detecting how the causes of earnings inequality changed from the 1988-1995 period to the 1995-2002 period by examining recent trends (2002), and 3) decomposing the earnings inequality increase further into price and quantity effects.

Earnings inequality in urban China continuously increased, even if adjusted for regional price differences (RPD). I have argued that earnings inequality should be measured in terms of a worker's purchasing power and reflect the cost of living in each region. By adjusting for RPD, I have showed that in the existing literature, the level of earnings inequality in urban China and the contribution of the province to it have been overstated, while the contribution of other factors were understated.

The earnings inequality decomposition result reveals how the causes of earnings inequality in urban China changed between the two periods 1988-1995 and 1995-2002 by primarily reflecting the labor-related institutional reforms. Individual ability, represented by education attainment and occupation, received greater rewards as China introduced market mechanisms into its urban labor system. The Chinese labor "market" seems to be functioning better, especially after the mid 1990s, due to the 1994 Labor Law and an increase in worker lay-offs. Employment status (permanent or temporary worker, etc.) and ownership were diversified and created earnings gaps. In particular, employment status became the largest disequalizing force between 1995 and 2002 (except residual). At the same time, incomplete and uneven marketization created labor market segmentations by province, industry, employment status, and ownership. It also should be noted that province, which had been the largest

disequalizer between 1988 and 1995 became the second largest equalizer between 1995 and 2002, reflecting the decline in inter-provincial inequality.

For both the periods 1988-1995 and 1995-2002, a large part of the explained inequality increase was due to price change (changes in the valuation of each individual attributes) and not due to quantity change (changes in the distribution of worker attributes). The contribution of price change even increased from 76.9% in the period 1988 to 1995 to 94.4% in the period 1995 to 2002 in terms of the change in log-variance.

6.2 Areas for future research

Although this paper aims to examine the causes of earnings inequality in urban China in detail, there exist some limitations in this research. First, it should be noted that the largest factor is the residual, which is an unexplained contributor to earnings inequality, accounting for about 60-70% of the level of and increase in earnings inequality in urban China between 1988 and 2002. A large contribution of the residual can be also observed in the case of earnings inequality in the US, even after controlling for observable human capital (Katz & Autor, 1999; Juhn, Murphy, & Pierce, 1993). Such a large residual contribution may include factors such as unobserved abilities of individuals, omitted variables such as the size and profitability of a firm, and errors in earnings data.[20]

Second, it is necessary to examine to what degree the supply and demand shift contributed to earnings inequality increase in urban China. In the US, where numerous studies have been carried out on the causes of earnings inequality increase, the effects of supply and demand shift across human capital groups were examined in addition to the institutional factors such as minimum wage and unionization rate.[21] In the US, the relative demand increase for highly educated workers, due to the product demand shift through increased imports from

[20] Knight and Li (2005) found a positive association between wage and firm profitability by analyzing the data from China's urban household surveys in 1995 and 1999.

[21] For a literature review on the causes of the earnings inequality increase in the US, see Katz and Autor (1999).

developing countries and skill-biased technological change, is considered to be one of the important causes of the rising earnings inequality. As discussed in Section 5, one possible explanation for a widening earnings gap between education groups is the relative demand increase for highly educated workers, as seen in the US. Also, supply and demand shift may have contributed to the changes in inter-provincial and intra-provincial inequality. However, there are almost no studies which estimate the degree to which supply and demand factors have contributed to earnings inequality in urban China.[22] In Asuyama (2008), I examine the supply and demand shift effects on earnings inequality increase in urban China.

Third, my sample largely excludes rural-urban migrants working in urban areas. The numbers of migrant workers having rural registration (*hukou*) continuously increased under China's economic reforms and rapid industrialization. According to a report by the State Council of China, the number of rural migrants working in urban and coastal areas was 118 million in 2004 (国务院研究室课题组, 2006). A large number of migrant workers not only directly changes the earnings distribution in urban China, but also indirectly changes it through influencing the labor supply and demand of workers with urban *hukou*.

Fourth, since my decomposition results are only for three discrete years (1988, 1995, and 2002), there might exist a year-specific effect. Examining more years, as well as examining the longitudinal data, is more desirable.

Lastly, it will also be interesting to see how the causes of earnings inequality in urban China have changed after 2002, and to see how they will change in the future, although we will need to wait for new releases of data in order to do this. Since around 2004, a shortage of low-skilled workers and a rise in their wages in the South China coastal region has been reported. This may have contributed to a reduction in the earnings gap among highly skilled and low-skilled workers. In addition, China's new labor contract law, which came into effect in 2008, may make the Chinese labor market less flexible. It is thought that the new law will make it

[22] One exception is Liu, Park, and Zhao (2007) which examined the supply and demand shift effects across education groups, although it is an "incomplete and preliminary" paper.

harder for employers to dismiss employees by imposing restrictions on the termination of a contract and requiring heavy severance pay. It also restricts the use of temporary workers (Khan & Barboza, June 30, 2007; Cooney, Biddulph, Zhu, & Li, 2007). Such new institutional reforms in China may bring about further changes in earnings inequality and its causes in urban China.

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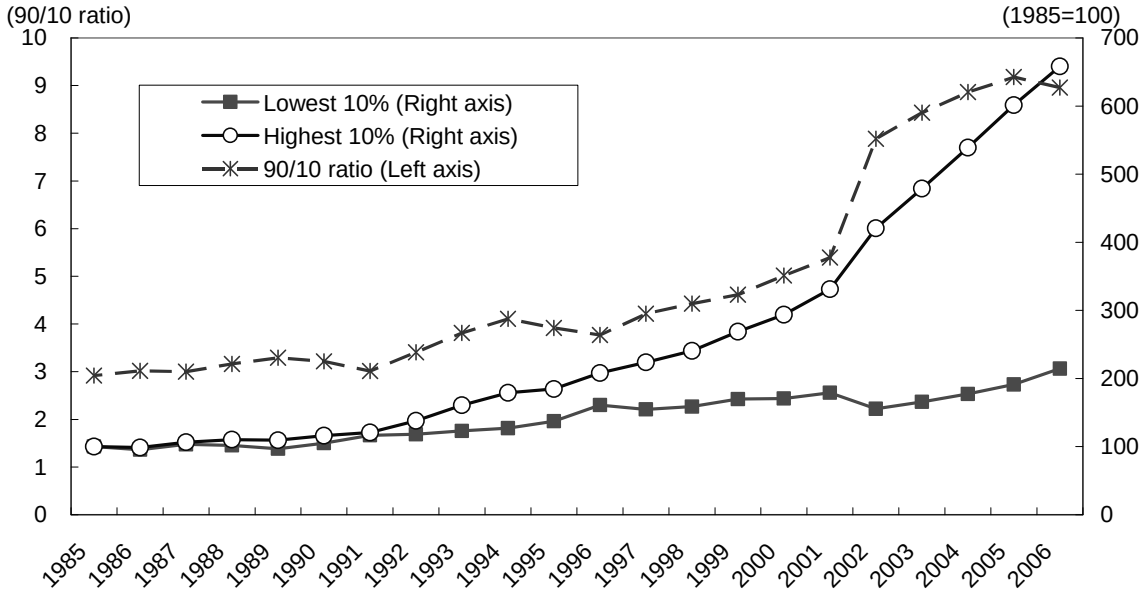
Figure 1. Real per capita annual disposable income and its inequality (90/10 ratio) in urban households: Lowest 10% and Highest 10% income groups



Notes: "Lowest 10%" and "Highest 10%" indicate the indices of per capita annual disposable income of urban households in the first income decile and the tenth income decile, respectively. Incomes are adjusted by the General Price Index of Urban Areas and 1985 income levels are set as 100. The 90/10 ratio is "Highest 10%" divided by "Lowest 10%".
Sources: China Statistical Yearbook, All China Marketing Research Co. "China Data Online"

Figure 2. Lorenz curve of unadjusted earnings

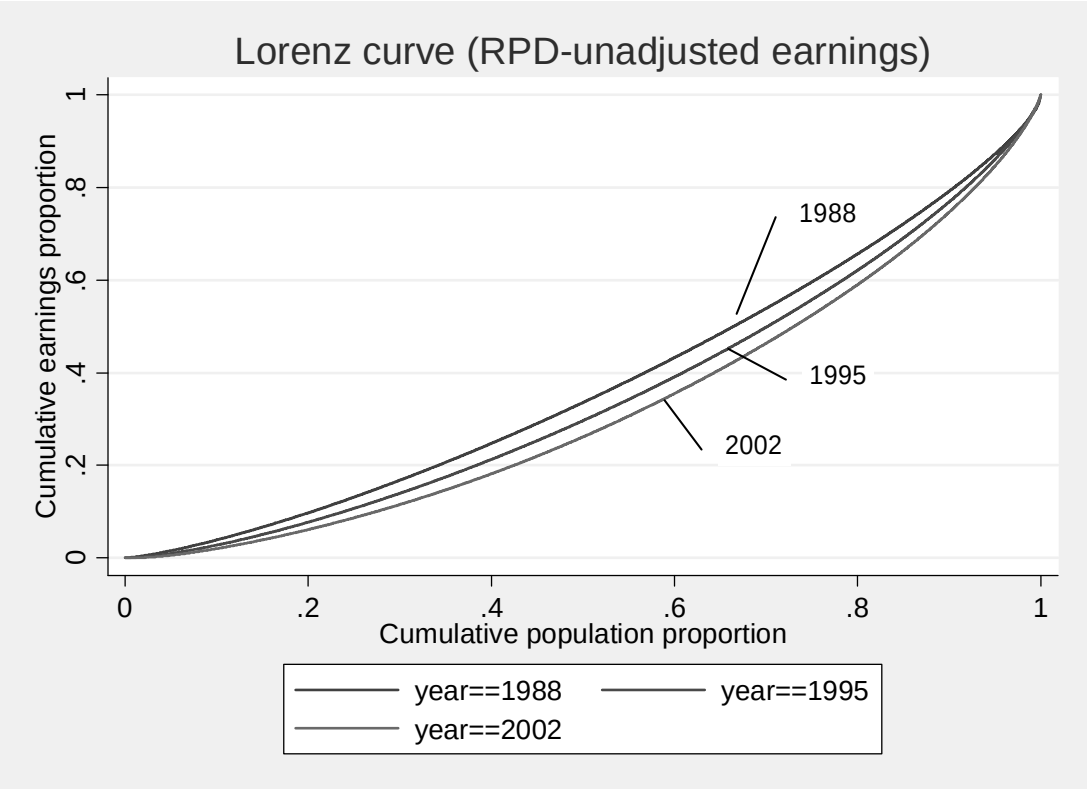


Figure 3. Lorenz curve of RPD-adjusted earnings

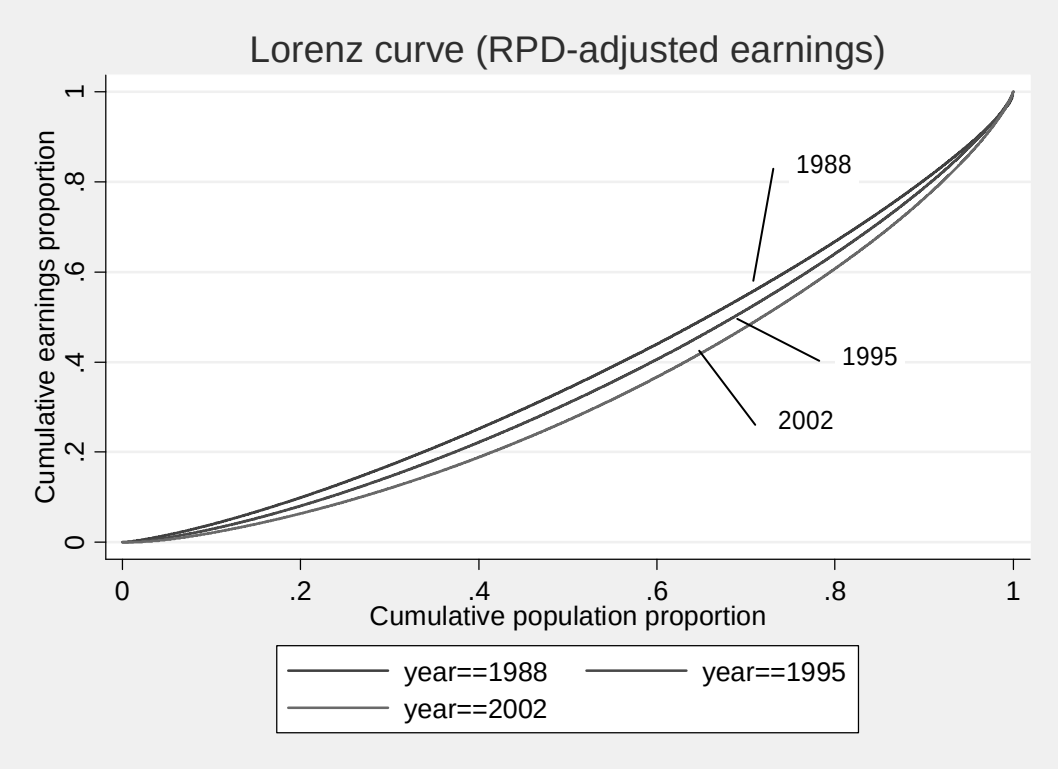
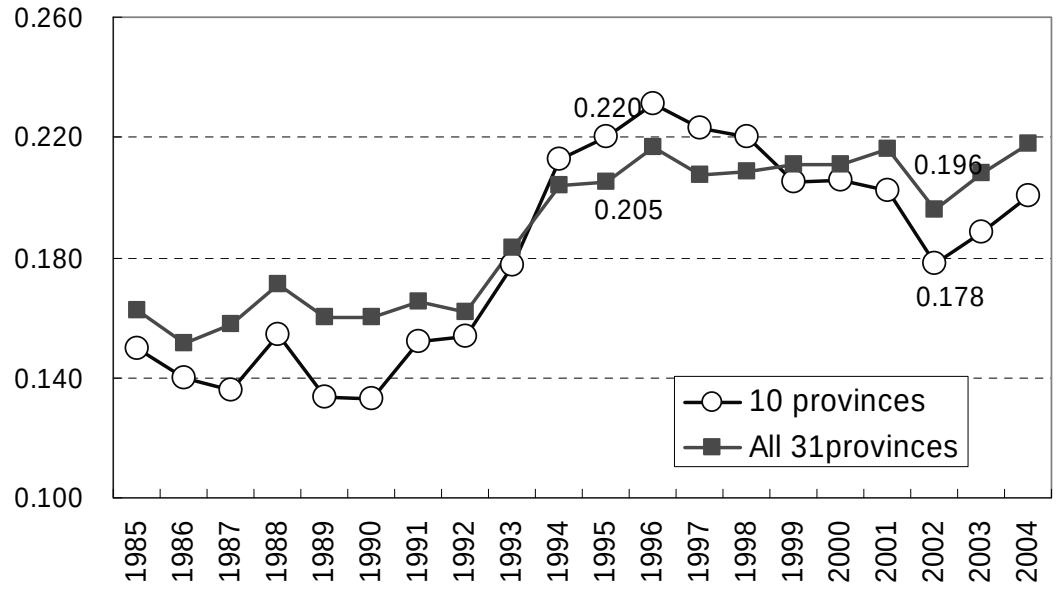


Figure 4. Coefficient of variation (CV) of urban household per capita annual disposable income in 10 and 31 provinces



Notes: The 10 provinces are the same as those used in my CHIP data analysis.
Earnings are RPD-adjusted.
Source: All China Marketing Research Co. "China Data Online"

Table 1. Summary statistics

			N			Share (%)			Mean of earnings (1988 yuan price)					
									Urban price			RPD-adjusted Beijing price		
			1988	1995	2002	1988	1995	2002	1988	1995	2002	1988	1995	2002
Total			**17,085**	**9,477**	**8,077**	**100.0**	**100.0**	**100.0**	**1,457**	**2,761**	**4,651**	**1,350**	**2,465**	**4,160**
sex	0	Male	8,963	5,044	4,549	52.5	53.2	56.3	1,580	2,991	5,074	1,465	2,672	4,547
	1	Female	8,122	4,433	3,528	47.5	46.8	43.7	1,321	2,499	4,105	1,223	2,229	3,661
min	0	Not minority	16,460	9,037	7,709	96.3	95.4	95.4	1,458	2,776	4,649	1,349	2,475	4,152
	1	Minority	625	440	368	3.7	4.6	4.6	1,422	2,450	4,691	1,373	2,262	4,347
cp	0	Not Communist Party member	12,970	7,064	5,589	75.9	74.5	69.2	1,357	2,543	4,150	1,254	2,273	3,713
	1	Communist Party member	4,115	2,413	2,488	24.1	25.5	30.8	1,770	3,399	5,776	1,650	3,025	5,165
edu	1	College or above	1,076	746	882	6.3	7.9	10.9	1,847	3,553	6,855	1,718	3,176	6,121
	2	Professional school	1,167	1,504	1,941	6.8	15.9	24.0	1,550	3,165	5,366	1,455	2,810	4,816
	3	Middle level professional, technical or vocational school, and upper middle school	6,190	3,969	3,326	36.2	41.9	41.2	1,409	2,689	4,350	1,298	2,403	3,870
	4	Lower middle school	6,604	2,806	1,752	38.7	29.6	21.7	1,407	2,509	3,477	1,312	2,250	3,136
	5	Elementary school and below	2,048	452	176	12.0	4.8	2.2	1,504	2,307	3,091	1,374	2,020	2,792
occ	1	Owner and manager of private or individual enterprise, and self-employed	109	68	142	0.6	0.7	1.8	1,450	3,052	2,857	1,354	2,724	2,508
	2	Professional or technical worker	2,743	2,092	1,798	16.1	22.1	22.3	1,628	3,177	5,692	1,526	2,849	5,111
	3	Head of institution or enterprise, division head in institution or enterprise, and factory director or manager	1128	1141	951	6.6	12.0	11.8	1,861	3,506	6,448	1,726	3,123	5,772
	4	Office worker	4,060	2,025	1,704	23.8	21.4	21.1	1,523	2,726	4,815	1,405	2,414	4,279
	5	Laborer and other (including salesclerk or service worker in 2002)	9,045	4,151	3,482	52.9	43.8	43.1	1,325	2,359	3,615	1,225	2,110	3,239
own	1	State-owned, at central or provincial level, and local publicly-owned	13,522	7,822	5,381	79.1	82.5	66.6	1,509	2,854	5,065	1,404	2,559	4,563
	2	Urban collective	3,436	1,457	603	20.1	15.4	7.5	1,237	2,159	3,108	1,132	1,909	2,816
	3	Private or individual enterprise, and self-employed	16	34	769	0.1	0.4	9.5	1,176	3,001	3,066	1,042	2,382	2,705
	4	Sino-foreign joint venture	55	111	142	0.3	1.2	1.8	2,595	3,573	5,851	1,931	2,910	4,963
	5	Foreign-owned	7	11	51	0.0	0.1	0.6	1,759	7,638	6,466	1,278	5,983	5,350
	6	Other	49	42	1131	0.3	0.4	14.0	1,214	2,666	4,346	1,024	2,165	3,797

			N			Share (%)			Mean of earnings (1988 yuan price)					
									Urban price			RPD-adjusted Beijing price		
			1988	1995	2002	1988	1995	2002	1988	1995	2002	1988	1995	2002
ind	1	Agriculture, forestry, animal husbandry, fishing, and water conservancy	169	168	100	1.0	1.8	1.2	1,412	3,012	4,621	1,338	2,726	4,286
	2	Manufacturing	7,387	3,894	2,038	43.2	41.1	25.2	1,412	2,558	3,987	1,319	2,293	3,577
	3	Mining and geological survey and prospecting	694	78	211	4.1	0.8	2.6	1,426	2,718	4,173	1,376	2,508	3,930
	4	Construction	585	253	261	3.4	2.7	3.2	1,489	2,942	4,838	1,389	2,587	4,175
	5	Transportation, communications, posts and telecommunications	1,157	497	676	6.8	5.2	8.4	1,606	3,061	4,989	1,449	2,712	4,470
	6	Commerce and trade, restaurants and catering, materials supply, marketing, and warehousing	2,418	1,364	822	14.2	14.4	10.2	1,482	2,486	3,508	1,318	2,213	3,055
	7	Real estate, public utilities, personal and consulting services, social services	393	367	1148	2.3	3.9	14.2	1,335	2,841	4,150	1,220	2,434	3,667
	8	Health, physical culture and social welfare	799	459	444	4.7	4.8	5.5	1,474	3,088	5,638	1,373	2,727	5,142
	9	Education, culture, and arts	1,265	718	775	7.4	7.6	9.6	1,528	3,115	5,860	1,440	2,786	5,308
	10	Scientific research and technical services	359	238	164	2.1	2.5	2.0	1,606	3,205	6,842	1,523	2,916	5,815
	11	Finance and insurance	269	197	229	1.6	2.1	2.8	1,346	3,155	5,404	1,259	2,838	4,806
	12	Government and Party organs, social organizations	1,486	1,177	1,027	8.7	12.4	12.7	1,492	3,009	5,519	1,389	2,694	5,006
	13	Other	104	67	182	0.6	0.7	2.3	1,202	3,098	4,079	1,120	2,745	3,470
emp	1	Permanent (including long-term contract) worker	16,779	9,142	6,215	98.2	96.5	76.9	1,466	2,777	5,065	1,359	2,484	4,567
	2	Temporary (including short-term contract) worker	267	239	903	1.6	2.5	11.2	910	2,157	3,745	787	1,774	3,144
	3	Private enterprise proprietor and self-employed	27	25	247	0.2	0.3	3.1	1,139	3,046	2,673	985	2,448	2,370
	4	Other	12	71	712	0.1	0.7	8.8	1,634	2,683	2,871	1,370	2,298	2,523
prov	1	Beijing	837	726	794	4.9	7.7	9.8	1,471	3,784	6,207	1,471	3,256	4,656
	2	Shanxi	1,820	1,053	720	10.7	11.1	8.9	1,310	2,127	3,891	1,222	1,939	3,479
	3	Liaoning	1,831	1,162	1,031	10.7	12.3	12.8	1,387	2,459	4,079	1,334	2,278	3,823
	4	Jiangsu	2,244	1,189	910	13.1	12.5	11.3	1,380	2,973	4,808	1,313	2,656	4,357
	5	Anhui	1,632	780	627	9.6	8.2	7.8	1,371	2,172	3,860	1,402	2,160	3,866
	6	Henan	1,982	913	856	11.6	9.6	10.6	1,239	2,064	3,518	1,215	2,144	3,827
	7	Hubei	1,883	1,109	950	11.0	11.7	11.8	1,364	2,585	3,942	1,317	2,273	3,578
	8	Guangdong	2,010	912	848	11.8	9.6	10.5	2,087	4,954	7,604	1,468	3,612	5,793
	9	Yunnan	1,731	1,045	810	10.1	11.0	10.0	1,518	2,529	4,483	1,485	2,451	4,413
	10	Gansu	1,115	588	531	6.5	6.2	6.6	1,392	2,006	3,762	1,362	1,919	3,595

Notes: Base categories (omitted variables in regression analyses) are highlighted. N: Number of observations.
sex: sex, min: minority status, cp: Communist Party membership, edu: educational level, occ: occupation, own: ownership, ind: industry, emp: employment status, and prov: province.

Table 2. Inequality indices of unadjusted and RPD-adjusted earnings

	Unadjusted					RPD-adjusted				
	1988	1995	2002	88-95	95-02	1988	1995	2002	88-95	95-02
N	17,085	9,477	8,077	-	-	17,085	9,477	8,077	-	-
mean	1,457	2,761	4,651	1,304	1,890	1,350	2,465	4,160	1,115	1,696
Gini	0.245	0.300	0.348	0.055	0.048	0.233	0.278	0.330	0.046	0.052
Theil entropy	0.116	0.156	0.208	0.041	0.051	0.103	0.132	0.185	0.029	0.053
90/10	2.904	4.072	5.328	1.168	1.256	2.843	3.749	5.011	0.905	1.262
50/10	1.804	2.174	2.555	0.370	0.381	1.807	2.123	2.505	0.317	0.382
90/50	1.610	1.873	2.086	0.263	0.213	1.574	1.766	2.000	0.192	0.235
75/25	1.668	1.969	2.344	0.300	0.375	1.664	1.909	2.290	0.245	0.381
95/5	4.316	6.937	10.145	2.621	3.208	4.113	6.271	9.436	2.158	3.165
log-variance	0.208	0.373	0.616	0.165	0.243	0.195	0.341	0.589	0.146	0.248

Notes: All indices are based on unadjusted or RPD-adjusted yuan earnings.
N: number of observations, Gini: Gini coefficient, 90/10: Ratio of 90th to 10th percentile (50/10, 90/50, 75/25, 95/5 are similarly defined).

Table 3. Contribution of RPD (regional price differences) to the inequality of unadjusted earnings

(Unit: %)

	1988	1995	2002	88-95	95-02
Gini	4.78	7.11	5.03	17.44	-7.82
Theil entropy	10.91	15.39	10.96	28.16	-2.51
90/10	2.07	7.94	5.95	22.51	-0.46
50/10	-0.15	2.33	1.94	14.44	-0.33
90/50	2.22	5.74	4.10	27.23	-10.33
75/25	0.26	3.03	2.28	18.44	-1.65
95/5	4.70	9.60	6.99	17.66	1.35
log-variance	6.19	8.72	4.49	11.89	-2.00

Note: For the computation procedure, see Section 3.2.

Table 4. Inequality decomposition of RPD-adjusted and unadjusted earnings (Gini coefficient)

(Unit: % except Gini)

	RPD-adjusted					**Unadjusted**				
	1988	**1995**	**2002**	**88-95**	**95-02**	**1988**	**1995**	**2002**	**88-95**	**95-02**
sex	2.16	1.69	1.67	-0.75	1.60	2.02	1.55	1.57	-0.55	1.75
min	-0.01	0.08	0.01	0.52	-0.37	0.00	0.09	0.00	0.50	-0.59
cp	1.68	1.27	0.71	-0.80	-2.28	1.54	1.17	0.68	-0.46	-2.35
exp	25.75	12.66	3.42	-54.32	-45.91	24.26	11.74	3.35	-43.74	-48.72
edu	2.04	3.05	5.76	8.23	20.22	1.84	2.77	5.53	6.91	22.64
occ	2.21	2.72	4.20	5.37	12.09	2.06	2.48	4.03	4.34	13.61
own	2.67	2.82	2.07	3.58	-1.90	2.56	2.68	2.09	3.17	-1.54
ind	-0.31	1.31	2.67	9.57	9.98	-0.29	1.17	2.53	7.65	10.95
emp	1.43	0.60	9.38	-3.66	56.29	1.20	0.49	8.65	-2.65	59.25
prov	2.12	9.42	4.14	46.76	-24.04	8.27	17.08	8.57	56.13	-44.22
residual	60.26	64.39	65.96	85.51	74.33	56.53	58.77	63.00	68.70	89.21
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Gini	**0.233**	**0.278**	**0.330**	**0.046**	**0.052**	**0.245**	**0.300**	**0.348**	**0.055**	**0.048**

Notes: Total (=100%) includes residual contribution, which is excluded in Tables 6, 7, and 8.
Inequality increase decomposition is based on the Gini coefficient.
For the notation of each factor, refer to Table 1.

Table 5. Inequality level decomposition of RPD-adjusted earnings

(Unit: %)

	1988	1995	2002
sex	5.45	4.74	4.91
min	-0.02	0.22	0.02
cp	4.22	3.57	2.09
exp	64.80	35.54	10.06
edu	5.13	8.57	16.91
occ	5.55	7.65	12.34
own	6.71	7.91	6.08
ind	-0.77	3.67	7.86
emp	3.61	1.69	27.55
prov	5.32	26.44	12.17
Total	100.00	100.00	100.00
Total explained	39.74	35.61	34.04

Note: The contribution of each factor is calculated by setting "Total explained" as 100%, where Total explained = R-squared = 100% - residual contribution. The dependent variable is RPD-adjusted log earnings.

Table 6. Inequality increase decomposition of RPD-adjusted earnings

(Unit: % except index)

1988-1995	Gini	Theil entropy	90/10	50/10	90/50	75/25	95/5	log-variance
sex	-5.20	0.00	0.83	-8.61	-130.50	-20.53	2.80	3.49
min	3.59	1.83	1.54	4.74	46.02	8.78	0.88	0.65
cp	-5.54	-0.78	-0.01	-8.66	-120.41	-19.59	1.80	2.42
exp	-374.78	-160.20	-125.76	-515.33	-5,547.43	-1,007.43	-44.33	-16.13
edu	56.76	31.56	27.51	73.27	664.29	131.06	17.95	14.64
occ	37.08	21.69	19.22	47.17	408.12	82.46	13.38	11.36
own	24.70	15.92	14.51	30.46	236.46	50.60	11.18	10.02
ind	66.02	33.41	28.18	87.37	851.96	162.14	15.81	11.53
emp	-25.24	-11.16	-8.90	-34.47	-364.71	-66.76	-3.56	-1.70
prov	322.61	167.73	142.87	424.06	4,056.19	779.25	84.09	63.75
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Total explained	14.49	21.01	22.64	12.05	1.71	7.57	27.74	30.09
Index	**0.046**	**0.029**	**0.905**	**0.317**	**0.192**	**0.245**	**2.158**	**0.146**

1995-2002	Gini	Theil entropy	90/10	50/10	90/50	75/25	95/5	log-variance
sex	6.22	5.44	5.55	6.29	7.03	6.11	5.32	5.18
min	-1.45	-0.57	-0.69	-1.53	-2.38	-1.33	-0.43	-0.28
cp	-8.88	-2.30	-3.23	-9.47	-15.73	-7.97	-1.28	-0.18
exp	-178.87	-65.54	-81.64	-189.10	-296.79	-163.29	-48.07	-29.01
edu	78.79	41.67	46.95	82.14	117.41	73.69	35.95	29.71
occ	47.11	26.25	29.21	48.99	68.80	44.24	23.04	19.53
own	-7.42	0.68	-0.47	-8.15	-15.85	-6.30	1.93	3.29
ind	38.87	20.27	22.91	40.55	58.22	36.31	17.40	14.27
emp	219.31	104.28	120.63	229.70	338.99	203.50	86.55	67.21
prov	-93.68	-30.18	-39.21	-99.41	-159.73	-84.95	-20.40	-9.72
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Total explained	25.67	30.11	29.39	25.33	22.25	26.20	30.94	31.89
Index	**0.052**	**0.053**	**1.262**	**0.382**	**0.235**	**0.381**	**3.165**	**0.248**

Notes: The contribution of each factor is calculated by setting "Total explained" as 100%, where Total explained = 100% - residual contribution. The dependent variable is RPD-adjusted log earnings.

Table 7. Decomposition of inequality increase into price and quantity effects (log-variance)

(Unit: % except index)

	88-95	of which		within each factor		95-02	of which		within each factor	
		Price effect	Quantity effect	Price effect	Quantity effect		Price effect	Quantity effect	Price effect	Quantity effect
	(Sj)	(P1)	(Q1)	(P2)	(Q2)	(Sj)	(P1)	(Q1)	(P2)	(Q2)
sex	3.49	2.77	0.71	79.58	20.42	5.18	5.84	-0.65	112.63	-12.63
min	0.65	0.61	0.04	93.90	6.10	-0.28	-0.33	0.05	116.57	-16.57
cp	2.42	2.10	0.32	86.83	13.17	-0.18	-0.08	-0.10	44.81	55.19
exp	-16.13	-17.51	1.38	108.55	-8.55	-29.01	-25.17	-3.84	86.75	13.25
edu	14.64	4.21	10.42	28.79	71.21	29.71	31.97	-2.26	107.60	-7.60
occ	11.36	9.47	1.88	83.40	16.60	19.53	21.10	-1.57	108.06	-8.06
own	10.02	10.74	-0.72	107.14	-7.14	3.29	3.46	-0.17	105.05	-5.05
ind	11.53	9.90	1.62	85.91	14.09	14.27	11.36	2.91	79.64	20.36
emp	-1.70	-6.07	4.37	356.27	-256.27	67.21	55.70	11.51	82.87	17.13
prov	63.75	60.67	3.08	95.17	4.83	-9.72	-9.48	-0.24	97.55	2.45
Total	**100.00**	**76.89**	**23.11**	**76.89**	**23.11**	**100.00**	**94.37**	**5.63**	**94.37**	**5.63**
Total explained	30.09					31.89				
Index	**0.146**					**0.248**				

Notes: The contribution of each factor (Sj) is calculated by setting "Total explained" as 100%, where Total explained = 100% - residual contribution.
The sum of (P1) and (Q1) for each factor is equal to (Sj).
(P2) and (Q2) are calculated by setting the contribution of each factor (Sj) = 100%
The dependent variable is RPD-adjusted log earnings.

Table 8. Intra-provincial (within-province) inequality

		Gini coefficient			Log-variance		
		1988	1995	2002	1988	1995	2002
1	Beijing	0.223	0.234	0.338	0.181	0.252	0.635
2	Shanxi	0.264	0.276	0.329	0.235	0.397	1.065
3	Liaoning	0.192	0.260	0.323	0.126	0.309	0.510
4	Jiangsu	0.201	0.257	0.345	0.164	0.290	0.505
5	Anhui	0.254	0.253	0.312	0.221	0.288	0.507
6	Henan	0.222	0.278	0.301	0.188	0.353	0.465
7	Hubei	0.192	0.243	0.287	0.132	0.249	0.448
8	Guangdong	0.290	0.305	0.360	0.273	0.374	0.615
9	Yunnan	0.201	0.210	0.261	0.145	0.237	0.435
10	Gansu	0.255	0.248	0.327	0.258	0.305	0.584
Coastal		**0.231**	**0.283**	**0.352**	**0.189**	**0.337**	**0.579**
Inland		**0.233**	**0.255**	**0.303**	**0.198**	**0.315**	**0.586**
Total 10 provinces		**0.233**	**0.278**	**0.330**	**0.195**	**0.341**	**0.589**

Notes: Highlighted provinces (Beijing, Liaoning, Jiangsu, and Guangdong) are classified as coastal and the remaining provinces are classified as inland.

Appendix: OLS regression result and decomposition-related figures by year

1988	Coef.	t	cor	sd	sj (%)
lnY			**1.000**	**0.442**	**100**
sex	-0.092	-15.85 ***	-0.209	0.499	2.16
min	-0.015	-1.12	0.012	0.188	-0.01
cp	0.058	8.43 ***	0.298	0.428	1.68
exp	0.046	47.63 ***	0.452	11.069	52.02
expsq	-0.001	-30.87 ***	0.367	493.413	-26.27
edu2	-0.022	-1.7 *	0.059	0.252	-0.08
edu3	-0.158	-14.13 ***	-0.072	0.481	1.23
edu4	-0.236	-19.14 ***	-0.049	0.487	1.26
edu5	-0.312	-19.53 ***	0.017	0.325	-0.38
occ1	0.001	0.03	0.002	0.080	0.00
occ2	0.020	2.39 **	0.149	0.367	0.24
occ3	0.048	4.57 ***	0.177	0.248	0.48
occ5	-0.051	-6.69 ***	-0.256	0.499	1.49
own2	-0.133	-17.32 ***	-0.207	0.401	2.50
own3	-0.099	-0.64	-0.027	0.031	0.02
own4	0.355	5.05 ***	0.030	0.057	0.14
own5	-0.003	-0.01	-0.006	0.020	0.00
own6	-0.017	-0.24	-0.042	0.053	0.01
ind1	-0.041	-1.72 *	0.005	0.099	0.00
ind3	0.034	2.37 **	0.007	0.197	0.01
ind4	0.024	1.66 *	0.016	0.182	0.02
ind5	0.019	1.66 *	0.045	0.251	0.05
ind6	-0.013	-1.42	-0.038	0.349	0.04
ind7	-0.088	-4.37 ***	-0.040	0.150	0.12
ind8	-0.067	-5.97 ***	0.023	0.211	-0.07
ind9	-0.091	-8.63 ***	0.055	0.262	-0.30
ind10	-0.038	-2 **	0.044	0.143	-0.05
ind11	-0.084	-3.78 ***	-0.017	0.124	0.04
ind12	-0.131	-13.36 ***	0.031	0.282	-0.26
ind13	-0.176	-4.06 ***	-0.035	0.078	0.11
emp2	-0.294	-8.79 ***	-0.168	0.124	1.38
emp3	-0.151	-1.37	-0.037	0.040	0.05
emp4	0.065	0.37	-0.003	0.026	0.00
prov2	-0.201	-13.69 ***	-0.099	0.309	1.39
prov3	-0.062	-4.59 ***	0.018	0.309	-0.08
prov4	-0.059	-4.41 ***	-0.004	0.338	0.02
prov5	-0.035	-2.33 **	0.012	0.294	-0.03
prov6	-0.162	-11.74 ***	-0.078	0.320	0.92
prov7	-0.110	-8.06 ***	0.004	0.313	-0.03
prov8	-0.037	-2.34 **	0.032	0.322	-0.09
prov9	-0.005	-0.35	0.091	0.302	-0.03
prov10	-0.100	-6.05 ***	-0.008	0.247	0.05
constant	6.897	349.91 ***			
N	17085				
F value	228.24				
R-squared	0.397				

Notes: The dependent variable is RPD-adjusted log earnings (lnY). Coef., t, cor, sd, and sj (%) represent estimated coefficient, t-statistics, correlation between each variable and lnY, standard deviation of each variable, and the contribution of each factor to the inequality level of lnY, respectively. For the definitions of explanatory variables, see Table 1. edu1, occ4, own1, ind2, emp1, prov1 are the omitted categories. Statistical significance is based on robust standard errors corrected for heteroscedasticity. *** denotes statistical significance at 1%, ** at 5%, and * at 10% level.

1995	Coef.	t	cor	sd	sj (%)
lnY			**1.000**	**0.584**	**100**
sex	-0.110	-10.66 ***	-0.179	0.499	1.69
min	-0.073	-2.96 ***	-0.030	0.210	0.08
cp	0.066	5.6 ***	0.258	0.436	1.27
exp	0.049	20.46 ***	0.371	9.578	29.66
expsq	-0.001	-14.05 ***	0.327	387.087	-17.00
edu2	-0.088	-4.88 ***	0.125	0.365	-0.68
edu3	-0.158	-9.03 ***	-0.032	0.493	0.43
edu4	-0.232	-11 ***	-0.110	0.457	2.00
edu5	-0.387	-11.56 ***	-0.093	0.213	1.31
occ1	0.071	1.26	0.013	0.084	0.01
occ2	0.088	5.91 ***	0.175	0.415	1.10
occ3	0.062	3.75 ***	0.184	0.325	0.63
occ5	-0.044	-2.96 ***	-0.260	0.496	0.98
own2	-0.195	-12.41 ***	-0.206	0.361	2.49
own3	-0.029	-0.21	-0.013	0.060	0.00
own4	0.241	4.43 ***	0.026	0.108	0.11
own5	0.808	3.84 ***	0.046	0.034	0.21
own6	0.018	0.22	-0.022	0.066	0.00
ind1	0.006	0.15	0.018	0.132	0.00
ind3	0.065	1.12	0.006	0.090	0.01
ind4	0.035	1.21	0.007	0.161	0.01
ind5	0.094	3.83 ***	0.035	0.223	0.12
ind6	-0.034	-2.05 **	-0.087	0.351	0.18
ind7	-0.044	-1.45	-0.041	0.193	0.06
ind8	0.069	3.16 ***	0.049	0.215	0.12
ind9	0.061	3.61 ***	0.084	0.265	0.23
ind10	0.093	3.75 ***	0.064	0.156	0.16
ind11	0.267	7.31 ***	0.036	0.143	0.23
ind12	0.040	2.49 **	0.077	0.330	0.17
ind13	-0.077	-0.85	-0.008	0.084	0.01
emp2	-0.132	-3.2 ***	-0.113	0.157	0.40
emp3	-0.027	-0.18	-0.007	0.051	0.00
emp4	-0.256	-3.04 ***	-0.053	0.086	0.20
prov2	-0.450	-18.91 ***	-0.151	0.314	3.65
prov3	-0.309	-13.98 ***	-0.040	0.328	0.69
prov4	-0.104	-4.84 ***	0.063	0.331	-0.37
prov5	-0.298	-12.85 ***	-0.054	0.275	0.76
prov6	-0.346	-14.69 ***	-0.079	0.295	1.37
prov7	-0.324	-15.19 ***	-0.027	0.321	0.48
prov8	0.128	5.04 ***	0.201	0.295	1.30
prov9	-0.217	-9.88 ***	0.030	0.313	-0.35
prov10	-0.452	-18.3 ***	-0.100	0.241	1.87
constant	7.532	216.29 ***			
N	9477				
F value	106.17				
R-squared	0.356				

Note: See the 1988 result.

2002	Coef.	t	cor	sd	sj (%)
lnY			**1.000**	**0.767**	
sex	-0.165	-11.09 ***	-0.157	0.496	1.67
min	0.036	1.02	0.008	0.209	0.01
cp	0.050	3.01 ***	0.234	0.462	0.71
exp	0.038	11.73 ***	0.195	9.623	9.25
expsq	-0.001	-8.49 ***	0.169	391.452	-5.82
edu2	-0.135	-5.14 ***	0.149	0.427	-1.12
edu3	-0.286	-10.18 ***	-0.058	0.492	1.07
edu4	-0.456	-13.7 ***	-0.204	0.412	4.98
edu5	-0.525	-9.33 ***	-0.083	0.146	0.82
occ1	-0.483	-3.67 ***	-0.197	0.131	1.63
occ2	0.060	2.83 ***	0.180	0.416	0.59
occ3	0.085	3.56 ***	0.193	0.322	0.69
occ5	-0.076	-3.63 ***	-0.266	0.495	1.30
own2	-0.230	-8.03 ***	-0.135	0.263	1.06
own3	-0.066	-1.8 *	-0.261	0.294	0.66
own4	0.290	5.64 ***	0.038	0.131	0.19
own5	0.382	5.28 ***	0.033	0.079	0.13
own6	-0.013	-0.58	-0.054	0.347	0.03
ind1	0.056	0.9	0.016	0.111	0.01
ind3	0.113	2.91 ***	0.005	0.160	0.01
ind4	0.043	1.15	0.007	0.177	0.01
ind5	0.142	4.77 ***	0.031	0.277	0.16
ind6	-0.052	-1.73 *	-0.179	0.302	0.37
ind7	0.059	2.42 **	-0.091	0.349	-0.25
ind8	0.222	7.01 ***	0.084	0.228	0.55
ind9	0.184	6.7 ***	0.125	0.295	0.89
ind10	0.213	3.62 ***	0.068	0.141	0.27
ind11	0.137	3.17 ***	0.033	0.166	0.10
ind12	0.110	4.33 ***	0.127	0.333	0.61
ind13	0.054	1.06	-0.041	0.148	-0.04
emp2	-0.302	-10.71 ***	-0.146	0.315	1.81
emp3	-0.695	-7.78 ***	-0.242	0.172	3.77
emp4	-0.472	-14.93 ***	-0.218	0.284	3.80
prov2	-0.427	-9.64 ***	-0.107	0.285	1.70
prov3	-0.003	-0.08	-0.033	0.334	0.00
prov4	0.016	0.51	0.024	0.316	0.02
prov5	-0.133	-4.01 ***	-0.017	0.268	0.08
prov6	-0.114	-3.7 ***	-0.019	0.308	0.08
prov7	-0.203	-6.59 ***	-0.046	0.322	0.39
prov8	0.294	8.55 ***	0.136	0.307	1.60
prov9	-0.015	-0.48	0.058	0.300	-0.03
prov10	-0.192	-5.48 ***	-0.050	0.248	0.31
constant	8.120	166.76 ***			
N	8077				
F value	89.45				
R-squared	0.340				

Note: See the 1988 result.