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Wages and Returns to Education in Chinese Cities*

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Abstract

This paper uses 1988 and 1995 data from a national household survey to document wages and returns to education for a large number of cities during China's economic transition. Between these two years, average real wages and returns to education increased, yet their spatial dispersions across cities widened dramatically. While market-oriented reforms were expected to equalize returns to human capital across regions, there was no sign of significant wage convergence in Chinese cities during this period. I argue that coordinated reforms in pension systems, housing markets, *hukou* registration, and local government behavior are imperative for improving the integration of local labor markets in China.

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1. Introduction

Labor market reforms in China have dramatically transformed the structure of employment and raised the economic welfare of the Chinese citizens. Since the inception of reform in late 1970s, the shares of employment in agriculture and the state sector have declined persistently. From 1978 to 2003, the share of labor employed in the primary sector, which is largely agriculture, fell from 70.5 percent to 49.1 percent; the share of urban labor working in the state-owned sector fell from 78.3 percent to 26.8 percent. A large body of literature studies the transfer of labor from agriculture to industries, labor migration from rural to urban areas, and the shift in the distribution of employment from state to non-state sectors in China.¹

In light of these structural changes, this paper examines the evolution of local labor markets in urban China, a topic that has received much less attention. Specifically, I investigate cross-section dispersions and over-time changes in wages and returns to education for a large number of Chinese cities in the years 1988 and 1995. The main purpose of the study is to evaluate whether local labor markets have become successfully integrated during the recent policy reforms.² When significant regional segmentation is found in the data, I move on to analyze policy options and institutional reforms that are needed for integrating labor markets in China.

¹ See Fleisher and Yang (2004) and Cai, Park and Zhao (2004) for recent surveys of the literature on China's labor market.

² In market economies, the term "local labor markets" typically refers to geographically distinct regions, including both rural and urban sectors. In China, there was a formal segregation of the rural and urban economies and their labor force prior to the reform; this division was the fundamental characteristic of the Chinese economy under planning. Since this segregation is still a major factor underlying Chinese labor-market problems and policies today, each sector involving a different set of issues, I choose to focus on the urban labor market in this paper.

In a well-functioning market system, labor flow across geographical locations is a central mechanism behind labor market equilibrium (e.g., Topel, 1986; Blanchard and Katz, 1992). Presumably, workers respond to regional differences in economic opportunities by moving to the locations with the highest pay. These labor flows would tend to result in convergence in wages for comparable labor and equalization of returns to education (after adjusting for variables such as local amenities and cost of living). In contrast, under central planning in China, local labor bureaus allocated workers to jobs, while labor flows across regions were nearly nonexistent. With progress in market-oriented reforms, improved labor mobility would have an effect to equalize wages for comparable labor and rates of return to education across regions. However, this process could be slow, as policy and institutional barriers may delay the transition to labor market efficiency. In fact, reforms may even result in wage divergence, if the pace of institutional changes varied across geographic localities. Hence, documenting the spatial dispersion and over-time changes in wages and schooling returns would shed light on the extent of labor market integration in China.

The data for empirical analysis are from the Chinese Household Income Project (CHIP), which contains detailed information on personal earnings and demographic characteristics with broad geographical representation.³ The first wave of CHIP covers 67 cities; the second wave includes 62 cities, and among them there is a panel of 29 cities included in both surveys. To analyze the data, I first use a set of spatial price deflators (which have become available recently) to adjust for costs of living across the cities.

³ CHIP is a large national representative household survey covering 10 provinces of varying income levels, with one extra province added to the 1995 survey. Riskin, Zhao and Li (2001) provide a detailed description of the CHIP data.

Then, I apply Mincerian earnings functions to estimate city-specific wages for basic labor as well as city-specific rates of returns to education. These estimates shed light on both spatial dispersion and over-time changes in wages and schooling returns in Chinese cities. Data suggest that average real wages increased by 40 percent and estimated rates of returns to education at the city level increased from 3.5 to 5.4 percent over this seven-year period. Empirical evidence also shows that the dispersion in the estimated earnings for basic labor and rates of return to education widened dramatically, with the standard deviation of each measure more than doubling. These findings give no sign of factor price equalization across Chinese cities.⁴

Next, I investigate directly whether there was wage convergence by estimating a generic convergence regression model (e.g., Barro and Sala-i-Martin, 1991, 1992) using the panel data of 29 cities. The results are mixed: the convergence coefficient is negative, suggesting a tendency of wage convergence across Chinese cities, but it is not statistically significant. These results are broadly consistent with the findings of other studies that report the lack of wage convergence for skilled worker groups across China's regional labor markets. By the middle 1990s, China still did not have well-integrated local labor markets after nearly two decades of policy reforms.

The rest of the paper is organized as follows. Section 2 provides an overview of labor market reforms in urban China and especially of regulatory and institutional changes that affect the functioning of regional labor markets. The discussion will cover

⁴ Many scholars have used the CHIP surveys for economic analysis. Among studies related closely to this paper, Johnson and Chow (1997), Liu (1998), Maurer-Fazio (1999) and Li (2003) examine returns to education in China, but use only one year of data. Gustafsson and Li (2000) and Knight and Song (2003) use both waves, but their primary focus is on income inequality and the gender earnings gap. Yang (2005a) uses both waves of CHIP to study regional dispersions and changes in returns to education over time, but that study does not examine wage structures and wage convergence, nor, like this paper, does it adjust for spatial differences in local costs of living.

the likely effects of policy reforms on the structure of wages and returns to education. Section 3 introduces the data, including personal characteristics of workers in the sample and the changing environments of China's urban labor markets. Section 4 analyzes earnings and rates of returns to education over space and time for the years 1988 and 1995, and investigates regional wage convergence within the period. The last section explores policy and institutional reasons behind the lack of wage convergence across Chinese cities, even though there were large potential gains in labor mobility. I argue that coordinated reforms in pension systems, housing markets, *hukou* registration, and local government behavior are imperative for integrating local labor markets in China.

2. Labor Market Reforms in Urban China

Through a gradualist approach, the Chinese government has implemented a set of reform policies and institutional changes, aiming to improve work incentives and labor market flexibility. This package of reforms has affected the distribution of wages at enterprise and city levels as well as across local labor markets. There have been improvements in labor mobility, both geographically and across occupations. The relationship between human capital and earnings has also been strengthened. I provide an overview of major policy reforms, emphasizing those that occurred in the 1980s and the first half of the 1990s. Later analysis will mostly refer to those time periods.

Under central planning, the Bureau of Labor and Personnel, which existed in every Chinese city, were responsible for implementing national employment plans by matching workers to *danwei*, i.e., the work units. Once hired by an enterprise, a worker was guaranteed lifetime employment; labor mobility was extremely rare. Following the

Soviet model, the planning authority introduced a unified grade system of wages in Chinese cities in the 1950s and continued to enforce it until the late 1970s. Wages were specified based on 8 grade levels for factory workers and technicians and 24 levels for administrative and managerial personnel. Although the system adjusted for schooling attainments, wage level depended primarily on seniority, rather than productivity or human capital. Local costs of living were also taken into account in setting wages across regions, but wage differences were small (Meng, 2000). Because of the compressed distribution of earnings and rigid rules of wage determination, scholars have used the term “wage grid” to describe the compensation system under central planning.

Another reason for complete immobility of labor across enterprises and geographic locations is that the work units were also the provider of social welfare. The state-owned enterprise, which was the dominant form of organization in urban areas, provided a full package of welfare benefits – such as housing, medical care, pensions, and sometimes even schooling and child care services – to the employees and their families. In effect, the enterprises were not only the place for production but also controlled political and social dimensions of everyday life. Complicated rules of benefit allocations within individual enterprises imposed high costs of labor mobility. The well-known household registration (or *hukou*) system, which designated the legal place of work and living for all citizens, was another obstacle for the geographic mobility of labor.

Starting in the late 1970s, the Chinese government has carried out a series of institutional reforms that aimed to strengthen work incentives in state- and collectively-owned enterprises. In the period between 1978 and 1984, state policy encouraged enterprises to link compensation directly to individual skills and performance, which led

to the revival of bonuses and piece rates (Walder, 1987). Incentive pay (bonuses and piece rates) as a share of total wage continued to rise in the 1980s (Groves et al., 1994).⁵ In 1984, amid the reforms of enhancing enterprise autonomy and managerial responsibility, the government approved the “Resolution on Economic Institutional Reform,” which replaced the wage quota system (under which the planning authority set the total wage bill for every enterprise) with a flexible wage system in which the total wage allocation of an enterprise reflected its profitability. This relaxation of control gave managers more freedom to implement incentive-based wage schemes. Overall, these labor market reforms gradually dismantled the wage grid and tended to widen the dispersion of wages. If human capital enhances labor productivity, as ample evidence shows in other countries, we would expect rising returns to education in China with the reforms.

There were also concerted efforts to end permanent employment and to facilitate labor mobility. Experiments on a labor contract system began in 1983; this system gave enterprises the right to hire and dismiss new workers according to their skills and performance. In 1986, the State Council announced the “Temporary Regulations on the Use of Labor Contracts in State-Run Enterprises,” and started implementing labor contracts nationwide. The coverage of the labor contract expanded quickly, rising from 3.7 percent of the labor force in the state sector in 1985 to 39 percent in 1995 (Meng, 2000). Admittedly, while new employees were hired on fixed-term contracts, state-owned enterprises seldom laid off low productivity workers until the late 1990s. The lack of

⁵ In 1978, the year in which bonuses were introduced, incentive pay only accounted for 3.1 percent of the total wage bill (Walder, 1987). By the end of the 1980s, the share of incentive pay increased to nearly 20 percent of wage payment among state-owned enterprises (Groves et al., 1994).

firing was mainly due to the fact that the SOEs shared the government's burden of maintaining social and political stability. Nevertheless, the adoption of labor contracts made labor mobility legally possible. Subsequent reforms in urban housing markets (e.g., Zax, 2003) and the pension system (e.g., Song and Chu, 1997; Zhao and Xu, 2002) further reduced the dependence of workers on the provision of welfare and social security by the SOEs, and thus reduced the costs of labor mobility across firms and regions. In the late 1990s, the Chinese government began implementing more aggressive enterprise reforms, including a massive one-time urban layoff (*xiagang*) program, the standardization of unemployment insurance, and further relaxation of controls over *hukou* registration (Cai, Park, and Zhao, 2005). These reforms removed several major remaining legal and institutional obstacles to labor mobility.

The impact of labor market reforms on wage structure and rates of returns to education can be assessed. The reform on work incentives, which linked pay to skill as well as performance, was the first step towards dismantling the wage grid and would increase the dispersion of wages within firms. Since the total wages of a firm depended increasingly on the firm's profitability rather than egalitarian distribution rules, interfirm wage differentials would also rise. Across local labor markets, we expect a widening dispersion of wages and schooling returns during the process of reforms, as economic environments and the pace of reforms vary across cities. On the other hand, improvements in labor mobility resulting from the reforms would act as an equilibrating force to facilitate the functioning of local labor markets. The pursuit of better pay would induce labor flows to regions with high wage growth, creating a force working towards the convergence in wages for comparable labor and the equalization of returns to

education. Empirical investigations into the distribution of wages and schooling returns, both spatially and over time, can shed light on the consequences of labor market reforms, in particular on the extent of market integration across Chinese cities.

3. Data

The two waves of CHIP household survey data in 1988 and 1995 were collected from two cross-section surveys designed and conducted by researchers from the Chinese Academy of Social Sciences along with Western scholars. The samples and questionnaires are comparable across the two years. The 1988 survey includes 9,009 urban households, covering 10 of China's 31 provinces. The 1995 survey adds one more province, namely Sichuan, and includes 6,931 households. To ensure compatibility, we use data from the same 10 provinces that are covered in both waves and exclude Sichuan from empirical analysis. Although the households in CHIP were sub-samples from the annual income and expenditure surveys of the State Statistical Bureau (SSB), the CHIP questionnaires contain much more detailed information, but the data still constitute a representative sample of urban households in China, as Riskin, Zhao and Li (2001) attest.

Our sample consists of 17,074 and 9,627 individuals for 1988 and 1995, respectively. These individuals are either permanent workers/employees of enterprises and institutions or long-term contact workers/employees who reported positive earnings. Individuals who received pensions or were formally designated as retired or students were excluded from the sample. We also exclude two other groups: temporary workers and private enterprise proprietors or self-employed individuals. The former group often works irregular hours that are not reported in the survey, so their earnings are

incompatible with permanent workers. The labor earnings of the latter group are difficult to compute because these earnings are often commingled with returns to household capital.

We define earnings to include all types of wages, i.e., basic, floating, contract and overtime pay, bonuses, pay from second jobs, all subsidies, hardship allowances, and income in kind. Although rich, the earnings records are not ideal. In particular, they do not include the value of medical care and pension accruals. Moreover, the value of enterprise-supplied housing is not reported in the survey as earned income. Throughout the paper, we take monthly earnings as the income measure. Although the wage rate is an alternative measure for studying returns to education, information on hours of work is available only in the 1995 survey, so we cannot compute wage rates for 1988.⁶

Table 1 presents information on monthly earnings and the distribution of workers and cities across the provinces in our sample. Columns (1) and (5) report real earnings measured in 1988 yuan and deflated by the national urban consumer price index. The average earnings for the whole sample increased from 1,972 to 2,812 over the seven-year period, a jump of 45.9%. Based on this measure, there are significant variations in average worker earnings across the provinces. The differentials become noticeably higher over time. In 1988, the monthly earning per worker for the richest province, Guangdong, is about 80% higher than for the poorest province, Henan. In 1995, that gap increases to 144%, as the comparison between Guangdong and Gangsu indicates.

However, the use of national price deflator in computing real incomes has a potential problem because consumer prices, even for identical products, do vary across

⁶ As Card (1999) explains, the use of earnings or wage rates in empirical estimation is common in the labor literature. Li (2001) discusses the biases that might be involved in using alternative measures for the CHIP data.

provinces in China, a fact that may reflect transportation costs or barriers to trade (Brandt and Holz, 2004). Unfortunately, China's National Bureau of Statistics (NBS) does not publish systematic data that permit a comparison of absolute commodity prices between different localities in specific years. To adjust for local costs of living, I adopt a set of spatial price deflators constructed by Brandt and Holz (2004), which are based on prices of a common basket of 64 goods from 10 broad categories of consumer goods and services. Columns (2) and (6) present the adjusted average earnings in 1988 yuan. These monthly earnings for the whole sample are lower than the levels reported in columns (1) and especially (5) for 1995, which are adjusted by the national price index. The standard deviations of earnings are also lower, a result that is consistent with a positive correlation between the price level and income across geographic locations because of the existence of non-tradable goods (Kravis and Lipsey, 1988). For the same reason, the ratio of earnings between the richest provinces and the poorest provinces becomes lower than before in both years. Moreover, the mean earnings adjusted for spatial price differences are more compatible than the unadjusted means with the national average monthly earnings in 1988 yuan of formal employees for these two years, which are 1747 and 2413 yuan, respectively (SSB, 1996). Hence, I apply the spatial price deflators at the province level to all earnings data for subsequent analysis.

The CHIP survey covers a large number of cities from geographically-dispersed regions, specifically, 67 cities for 1988 and 62 for 1995. On average, 255 and 155 individuals were surveyed in each city in each of the two years. As the last column of Table 1 shows, the surveys cover 29 cities in both years so that we can construct a two-year, city-level panel. These cities, which are rather spread out over China, can be

considered to be local labor markets with varying institutional environments. This rich data structure will allow us to estimate city-specific worker earnings and rates of return to education and examine their cross-section dispersion and over-time changes. Moreover, the city panel may help in examining whether there was wage convergence across regional labor markets within the seven-year period.

Table 2 presents summary statistics for the key variables. The upper panel reports a few familiar personal characteristics used to investigate earnings. Completed years of schooling increase by 1.1 years over the seven-year period, while labor market experience remains stable. The CHIP surveys report educational attainment in seven categories based on completion levels. To estimate returns to years of education, each completion category should be matched with years of education. Based on previous studies and education systems in China, we make the following assignments: college and above (16 years), community and vocational college (14 years), high school (12 years), lower middle school (9 years), primary school (6 years), three years or more of primary school (4 years), and less than three years of primary school (2 years). Following the usual convention, experience is approximated by subtracting years of schooling plus six from age. Regarding other personal characteristics, male workers account for the majority of the labor force, ethnic minorities make up 3.7% and 4.6% of all workers in the two years, and the percentage of Communist Party members rises from 24% to 26.1%, despite the declining role of the party in economic activities during reform.

The lower panel of Table 2 summarizes a few characteristics of the changing labor force and market environments of the cities that may affect wage structures and the payoffs to education in local labor markets. These characteristics reveal several

interesting features of China's labor markets over the seven-year period. The supply of skilled workers, as measured by the percentage of workers having an education higher than the lower-middle-school level, increases from 49.3% in 1988 to 66.2% in 1995.⁷ Meanwhile, the percentage of workers who are employed by foreign and joint-venture firms almost triples, although this percentage remains low in 1995. Information infrastructure, measured here as the percentage of households with home telephones, rose dramatically from 4.9% to 41.8%. Another variable that indicates the extent of labor market transition is whether current employees found their jobs through market channels. This variable is reported in the 1995 CHIP survey as getting jobs through non-public agencies or by workers themselves. In that year, 13% of the labor force found their current jobs through market channels. Unfortunately this variable, which is indicative of local labor market development, is missing in the 1988 survey.

4. Wages and Returns to Education over Space and Time

4.1 The Empirical Specification

The Mincerian equation is used widely in analyzing the relationship between human capital and earnings. We adopt a variant form of the basic specification for estimating returns to education, written as:

$$\log Y_i = \beta_0 + \beta_1 S_i + \beta_2 E_i + \beta_3 E_i^2 + \sum_{j=1}^3 \gamma_j X_{ij} + \mu_i, \quad (1)$$

⁷ More specifically, the percentages of workers with educational attainment at primary school or lower, lower middle school, high school, and vocational college or higher are 11.9%, 38.8%, 24.8% and 24.5%, respectively, for 1988. The percentages of workers in the corresponding categories in 1995 are 4.5%, 29.3%, 24.7% and 41.5%, respectively. These changes are associated with the reported increase of 1.1 years in average schooling for the sampled workers.

where Y_i is monthly earnings for worker i , S_i is years of schooling, E_i is potential labor market experience, E_i^2 is experience squared, and μ_i is an error term with $E(\mu_i) = 0$. The variable X_{ij} represents three other personal characteristics that may also affect personal earnings, namely gender, Communist Party membership, and minority status,

In equation (1), β_1 measures the average rate of return to an additional year of education for the individual in the sample. Human capital theory posits that schooling enhances the productivity of an individual, so that we expect $\beta_1 > 0$. On-the-job training, which is often correlated with experience, may also have a positive effect on earnings, so that we expect $\beta_2 > 0$, but diminishing returns to experience lead us to expect $\beta_3 < 0$. Other personal characteristics, such as gender, Communist Party membership and ethnicity, may also have their own separate effects on earnings independent of schooling. However, if these variables are correlated with education, including them in equation (1) would affect the estimate of β_1 systematically.

Ordinary least squares (OLS) is widely used to estimate the human capital earnings function. However, the omission of an individual's ability in the OLS regression may result in a biased and inconsistent estimate of the returns coefficient due to positive correlation between schooling and ability. Three strategies are used to deal with this ability bias: the instrumental variable approach, the fixed effect method, and direct measurement of ability (see Card, 1999). However, each of these approaches has stringent data requirements. Another potential complication is that individuals may have differential rates of return to education. As Heckman and Li (2004) demonstrate using 2000 Household Survey Data collected by the State Statistical Bureau, heterogeneity

among people in returns to schooling is substantial in China.⁸ OLS estimates that do not account for population heterogeneity and sorting in school attendance lead to under-estimation of rates of returns to education. By modeling heterogeneity and comparative advantage explicitly for young people in the urban areas of six provinces in China, Heckman and Li find that sending a randomly-selected person to college results in a 43% increase in that person's lifetime earnings or a 10.8% increase in annualized returns in 2000, whereas the OLS estimator yields a 29% increase in lifetime earnings or a 7.25% increase in annualized returns.

While acknowledging these estimation issues, we choose the OLS procedure because the CHIP surveys do not have extensive enough data to permit careful corrections for the ability bias and because an approach that takes explicit account of sorting in educational attainment may not be crucial for this group of workers, who obtained their education prior to the inception of reform in 1978. At that time, rigid policy rules, rather than self-selection and comparative advantage, influenced individual schooling attainment.⁹ Moreover, OLS results in compatibility with existing studies on returns to education in transition economies because these tend not to control for the biases arising from omitted variables.¹⁰

⁸ People sort into different schooling levels, which is due in part to their differential returns to education. According to Heckman and Li, the effect of a four-year college education on lifetime earnings for individuals who actually attend college is 51.5 percentage points. By comparison, the estimated return to college education for those who did not attend college is 36.3 percentage points, a rate much lower than the schooling returns for college attendees.

⁹ Although the OLS estimator is shown to have a downward-bias by Heckman and Li (2004), the extent of the bias may not be as important for analyzing changes in rates of return over time, which is an emphasis of this paper.

¹⁰ Giles et al. (2004), which uses city-specific education-disruption variables related to the Cultural Revolution in China as instruments to control for unmeasured ability, is an exception.

Equation (1) imposes the implicit assumption that earnings for basic labor, i.e., intercept of the regression, and rates of return to schooling are the same across all cities. While the specification provides an average rate of return estimate for the entire sample, the two restrictive assumptions are rejected strongly in subsequent data analysis. To relax these restrictions and allow differences in earnings for basic labor and rates of return to education across the cities, we use the following, more flexible empirical form:

$$\log Y_i = \sum_{k=1}^n \beta_{ek} D_{ik} + \sum_{k=1}^n \beta_{sk} S_{ik} D_{ik} + \beta_2 E_i + \beta_3 E_i^2 + \sum_{j=1}^3 \gamma_j X_{ij} + \mu_i, \quad (2)$$

where β_{ek} is a parameter of $\log(\text{earnings})$ for basic labor to be estimated for city k , β_{sk} , a schooling rate-of-return parameter, and D_{ik} is a city-level dummy variable such that $D_{ik}=1$ if worker i resides in city k , and $D_{ik}=0$, otherwise. Consequently, the estimation of equation (2) yields 67 and 62 city-specific estimates of earnings for basic labor and rates of return to schooling for the 1988 and 1995 sample, respectively. These estimates for individual cities are used to examine variations in wages and schooling returns across space and over time.

4.2 The Empirical Results

Table 3 presents the results of estimating earnings functions for the 1988 and 1995 cross-section data. Columns (1), (2), (4) and (5) report coefficients for equation (1) and its variants to show average returns to education and other personal characteristics across all cities. Columns (3) and (6) report coefficients for equation (2) to yield city-specific earnings for basic labor and rates of returns to schooling. While the 258 (=67×2+62×2) estimated parameters are not shown in the table, they will be studied carefully in subsequent analysis. All regressions are estimated by OLS with Huber-White

robust standard errors to correct for heteroscedasticity of an unknown form. The fact that individual samples are drawn from various groups, e.g., families or enterprises of different ownership types, may lead to heteroscedastic errors. For all regressions, the high F-values reject the null hypotheses that all of the coefficients are jointly equal to zero.

Several noticeable findings emerge from a comparison of the 1988 and 1995 estimates. First, the average rates of return to education increased substantially over the seven-year period, rising from 3.2 and 3.9% in 1988 to 6.1 and 7.2% in 1995. Correspondingly, substantial increases in the returns to experience, rising from a range of 4.1 to 4.5% to 7.0 to 7.5%, are found; the results reveal the expected diminishing returns to experience for both years. Consistent with these trends, the gender earnings gap rises sharply in percentage terms, rising from 9.7 and 11.1% to 15.7 and 16.5%. At the same time, the returns to Communist Party membership also increase, from 7.7 and 8.3% to 11.3 and 13.1%. Overall, minority members receive comparable earnings with Han Chinese, as the estimated differentials are small in magnitude and not statistically significant.

These results on the rising returns to education and the widening gender earnings gap over the period from 1988 to 1995 are broadly consistent with previous research.¹¹ It is interesting to note the rapid increases in the returns both to experience and to Communist Party membership. The combined evidence on the diverging returns to worker characteristics are related closely to a previously-documented trend that, since the

¹¹ Among studies using the CHIP data, the range of estimated schooling returns based on alternative functional specifications is 2.8% to 3.6% for 1988 and 4.7% to 6.9% for 1995 from Johnson and Chow (1997), Liu (1998), and Li (2003). Based on data from the Urban Household Income Survey collected by NBS, Zhang and Zhao (2002) report slightly higher rates of returns at 4.7% for 1988 and 7.7% for 1995, with a similar rising trend. Moreover, our findings on the gender earnings gap confirm the results reported by Gustafsson and Li (2000).

inception of reforms in 1978, China has experienced the largest increase in income inequality among all countries for which comparable data are available (World Bank, 1997; Yang, 1999). Wage inequality may be decomposed into changes in the distribution of worker attributes and changes in the returns to those attributes. Hence, our findings on diverging returns to worker characteristics point to an important source of the rising income inequality during China's economic transition.¹²

For both 1988 and 1995, the estimated rates of return to schooling are lower if gender, Communist Party membership and ethnicity are added to the basic specification. This change is due to the correlation between educational attainment and personal characteristics. For both years, schooling is positively associated with being male and being a party member; for 1995, schooling is negatively associated with being a minority.¹³ It is worth noting that the rising returns to party membership refute the hypothesis that the relative importance of political capital, such as party membership, in earnings determination should decline over time with economic reforms. Evidence seems to support an alternative view: that party membership is a useful career investment that could provide a positive signal to potential employers about the person's unobserved quality, which would in turn generate higher earnings.¹⁴

In summary, the evidence presented so far suggests that China's wage structure became more diverse over the seven-year period as the returns to human capital variables increased and gender and party member wage gaps widened. In addition, a larger portion

¹² Park et al. (2003) provides detailed decomposition analysis.

¹³ The regressions are in linear form, with schooling as the dependent variable. The coefficients and corresponding t-values for gender, party membership and minority are 0.32 (7.1), 1.22 (22.92) and 0.058 (0.50) in 1988 and 0.24 (4.5), 1.22 (19.98) and -0.507 (-4.05) in 1995.

¹⁴ See Xie and Hannum (1996), Morduch and Sicular (2000) and Liu (2003) for more systematic analysis and other channels through which Communist Party membership could affect earnings during economic transition in China.

of wage variation is no longer explained by this set of explanatory variables, as the value of the R^2 statistics declines dramatically from 1988 to 1995.

Although useful in providing a general picture of nationwide changes, these estimated returns to education are based on the assumption of equal earnings for basic labor and equal schooling returns across local labor markets. However, F-tests reject strongly the notion of equal intercepts and school coefficients across cities with F statistics equal to 1.81 and 6.31 for 1988 and 2.00 and 4.81 for 1995. Hence, I adopt the more flexible form in equation (2) to estimate city-specific basic wages and rates of return to schooling.

Table 4 presents the results of analyzing the estimated earnings for basic labor and rates of return to education across the sampled Chinese cities for 1988 and 1995, highlighting the dispersion of the estimates. Over the seven-year period, real $\log(\text{earnings})$ paid to basic labor declines from 6.36 to 6.18; a paired t-test on the equality of these two levels gives $t=3.21$, suggesting that the difference is statistically significant. Meanwhile, the average rate of return to education for these cities increased from 3.5 to 5.4%; the t-test statistics of 6.2 also indicate a statistically-significant upward shift. These results, combined with earlier findings of rising returns to party membership and a widening gap in gender earnings, suggest that within those cities egalitarian wage compensations were largely replaced by a reward system based on personal characteristics during the seven-year period. Across the cities, both the dispersion in basic earnings and rates of return to education widen substantially. City-specific $\log(\text{earnings})$ for basic labor increases from a range of (5.64, 6.98) to (4.73, 7.14), while the range of schooling returns stretches from (0.01, 0.07) to (-0.02, 0.13). Other measures of

inequality confirm the same pattern of widening variations in wages and schooling returns. For $\log(\text{earnings})$, the standard deviation, coefficient of variation, and GINI coefficient in the city-level estimates more than double during this period. For rates of return to education, the same inequality measures increase substantially.¹⁵

To illustrate the changes in variable dispersions, Figure 1 plots along x-axis the estimated $\log(\text{wage})$ of basic labor for 1988 and 1995 across Chinese cities, with y-axis indicating observed city average $\log(\text{wage})$ for the two years. The plot for 1988 is a tight cluster of points, which is consistent with the uniformity of wage controls existing across regions during that time. The scatter plot for 1995 has a higher mean and, more importantly, a wider spread of wages for basic labor. Moreover, the upward sloping cluster of data points shows that cities with higher average earnings pay higher wages to an unskilled labor force with limited work experience.

Figure 2 illustrates the dispersion of estimated rate of returns to education across Chinese cities for 1988 and 1995 along x-axis, again with y-axis showing city average $\log(\text{wage})$. The rates of return to education for 1988 are scattered within a narrow range, but for 1995 the points of estimates are widely spread out in the figure. These changes in the distribution of returns to education during transition are consistent with a gradual relaxation of the wage grid inherited from central planning. However, data do not seem to suggest any systematic relationship between the level of local income and rates of return

¹⁵ Previous studies giving attention to spatial variations in schooling returns in China are Liu (1998) and Maurer-Fazio (1999). Liu compares the returns to education between Guangdong province and all other provinces, while Maurer-Fazio places the provinces into categories (namely, developed coastal, northern, interior and less developed regions) in an attempt to examine whether rates of return differ systematically across these broad locations. Both studies use only the 1988 CHIP data and neither studies differential returns at the city level. Yang (2005a) examines spatial variations in schooling returns in China, but does not investigate changes in wage structures.

to education. In 1995, for instance, high school returns are found in cities with both high and low earnings. Similarly, there are no specific patterns emerging from the 1995 estimates.

Nevertheless, the large cross-city variation in the rates of return to schooling in China is striking given the fact that the estimates are generated using uniform procedures and comparable data. For the two years, the coefficients of variation of the estimated schooling returns are 0.343 and 0.542, respectively, which are quite large by international comparison. In a study using microeconomic data, Trostel et al. (2002) estimates economic returns to schooling in 28 countries worldwide. Due to differences in data sources (e.g., diverse market institutions, high isolation of international labor markets, whether income is measured before or after tax), cross-country dispersions in schooling returns are expected to be large. These authors compute rates of return to education separately for men and women. The coefficients of variation for their international estimates are 0.589 and 0.571, which are comparable with the cross-city variations in China, especially with the 1995 figure. Therefore, by the middle 1990s, the large differentials in wages and returns to education give no sign of factor price equalization across the Chinese cities.

4.3 Convergence or Divergence of Wages?

Inequality in factor prices across geographic localities may not necessarily imply divergence of wages. An important economic and policy issue is whether poor cities tend to experience faster wage growth than rich ones, as labor market efficiency requires that the value of marginal product of workers be equalized across local labor markets. Labor

mobility is an important equilibrating mechanism. Presumably, if there exists a competitive market, spatial disparities in wages and returns to education would attract labor migration from cities with low earnings to places with better pay so that wage gaps will be reduced over time. This process would generate gains to the economy through improved labor market efficiency. In the U.S., where competitive forces exist in regional markets, there has been a steady convergence of relative wages across the states (see Barro and Sala-i-Martin, 1991, 1992; Blanchard and Katz, 1992). These studies typically report a slow, yet statistically very significant, process of convergence in wages and incomes.

Given the large differentials in earnings across the Chinese cities, we would expect a quick convergence in regional income levels if there were no major policy and institutional barriers to labor mobility. To examine whether convergence actually took place between 1988 and 1995, we estimate the generic regression model

$$\log w_{k,1995} - \log w_{k,1988} = \alpha + \beta \log w_{k,1988} + \varepsilon_k \quad (3)$$

where $w_{k,t}$ is the earning in city k in year t , and β is the convergence coefficient, which takes a negative value if there is wage convergence across cities. In studies of income convergence across the states in the U.S., a benchmark estimate for the coefficient β is around -0.02, i.e., 2 percent per year, suggesting that the half-life of interstate wage differentials is roughly 30 to 35 years. During the seven years of Chinese economic reforms, if the local labor markets began to operate efficiently, we would expect a negative and statistically-significant parameter estimate for β .

Figure 3 plots the annual rate of growth of log monthly earnings for the panel of 29 Chinese cities during the period 1988 to 1995 against their log value in 1988. The line

is the regression line of fitting equation (3) with a slope of -0.033, which is measured at an annual rate, a t-statistics of -1.03, and an R^2 of 0.038. These results suggest that, despite a negative convergence coefficient with its magnitude in line with expectations, there was no statistically-significant pattern of wage convergence across the Chinese cities between 1988 and 1995. The incentive for labor migration was present, but equilibrating mechanisms did not work effectively to arbitrage away the large intercity wage differentials. This finding is consistent with the view that by the middle 1990s, significant legal and institutional barriers still existed in China, which prevented interregional labor flows from reaching the expected levels. Using census data, Johnson (2003) reports that interprovincial migration in China between 1990 and 2000 was about one-fourth the magnitude of interstate migration in the United States in the same period. Given the severe regional labor-market disequilibrium in China, a more telling benchmark is the United States during its period of greatest rural-urban population relocation, which was ten times the magnitude of China's migration flows in the 1990s, relative to population.

In a more detailed investigation using the same data, Yang (2005b) differentiates the workers into four skill groups---graduates from primary, middle, high schools, and two-year college and above---to examine whether the speed of convergence varies across different skill groups. His analysis yields similar conclusions as discussed earlier: the convergence coefficients are negative but not statistically significant. Therefore, there were no strong signs of spatial wage equalization across workers of all skill levels. There is an interesting finding, however: the absolute value of the convergence coefficient for primary school graduates (-0.073) is significantly higher than the coefficients for more

skilled groups (-0.038, -0.039, and -0.031). Although these estimates are not significant at the conventional level, the result suggests that the speed of wage convergence in China is likely quicker for the unskilled labor force than for workers with higher levels of education. This pattern is consistent with the fact that, between 1988 and 1995, an enormously large number of rural workers continued to migrate temporarily into urban labor markets (See Fleisher and Yang, 2004; Cai, Park and Zhao, 2004). Therefore, when the choice of destination for rural temporary workers responded to wage differentials in cities, these migration flows could lead to faster wage convergence for the unskilled labor force.

5. Priorities for Further Reform

The empirical findings of this paper indicate serious labor market fragmentation in China after nearly two decades of policy reforms. Between 1988 and 1995, the dispersion in earnings for basic labor and in rates of return to education widened across Chinese cities. In spite of strong incentives for labor movement to arbitrage regional wage differences, there was no significant wage convergence across localities. By the end of that seven-year period, the rates of return to education in China remained low relative to other countries, notwithstanding significant increases since the inception of reform.¹⁶ These situations are likely to have continued into the present, because no major reform measures have been implemented in the past several years for improving the functioning of labor markets in China, as recent literature surveys suggest (Fleisher and Yang, 2004; Cai, Park and Zhao, 2004).

¹⁶ Psacharopoulos (1994) reports that the average rate of return to education is 10.1% for the world and 9.6% for Asia; for low and middle income countries, the author finds returns to education from 11.2% to 11.7%.

The findings on the segmentation of local labor markets and low returns to education call for further policy reforms. Since performance-based compensation and employment contracts are already widely implemented in China to solve labor incentive problems, future reforms should concentrate on policies and institutions that could enhance labor mobility and promote local market integration. Improvements in labor mobility should act as an equilibrating force to close the gaps in wages and returns to education across geographic locations. Below, I identify four potential areas for further reform.

(1) *Raising the portability of pensions.* Prior to urban reforms in the early 1980s, China had a pure PAYGO social security system managed within individual state and collective enterprises. This system imposed high costs on labor mobility because changes in employment, especially for older workers, would imply net pension burdens to new firms. To relax this constraint on job changes, along with other reform objectives, the Chinese government has implemented a sequence of pension reforms, including financial pooling across firms beginning in the mid 1980s; joint financial contributions by workers, firms, and local governments; and the inclusion of nonstate workers in the pension system starting in the second half of 1990s (Zhao and Xu, 2002). In 1997, with the issuance of *A Decision on Establishing a Unified Basic Pension System for Enterprise Workers*, the level of pooling was raised officially to the province, although noncompliance and evasion from fiscal contributions were pervasive in subsequent implementations.

Despite significant progress in pension reforms, serious barriers to labor mobility remain. To date, workers still face complicated problems of transferring pensions when

they seek employment in other cities, especially across provincial borders. Accepting a new job outside a province would imply the loss of future pension benefits from the previous work unit, and labor inflow of older workers into a province would often imply net pension burdens. Moreover, since pension pools are managed by local governments, regions with poor fiscal conditions often have serious difficulties of raising sufficient funds for allocating pensions to the retired under the PAYGO social security system. The anticipated natural aging of the Chinese population will only exacerbate the existing problems.

One proposal for improving pension portability is to establish fully-funded individual pension accounts that are invested to earn competitive returns. These personal accounts would be portable when workers seek employment in other cities or provinces. In 2001, the Chinese government initiated an experiment in Liaoning province in which newly-established social security agencies would take over pension and other social security responsibilities from individual enterprises. Establishing fully-funded individual pension accounts was an important part of the experiment. The main objective was to detach the provision of pensions from enterprises and thereby create portability of pension accounts across firms, ownership types, and geographic regions. Successful implementation and propagation of this pension initiative would reduce the costs of labor mobility and promote labor market integration.

(2) *Accelerating housing reforms.* Under central planning, state-owned enterprises (SOE) provided the bulk of urban housing in China. Rents were set at extremely low levels, as housing provision constituted a major component of the remuneration package. This was one major channel through which urban employees were

tioned to specific work units. To compliment the role of housing provision by SOEs, municipal housing bureaus also supplied apartments to urban residents who worked for small SOEs and urban collectives--enterprises that did not have sufficient resources to manage their own housing construction and management. Prior to the inception of reforms, private housing was present in urban China, as the government allowed some homeowners to retain their own old residence. According to the first national housing census conducted in 1985 in 323 cities, the state work units provided 75% of the total housing stock, while the housing bureaus and the private sector supplied 9% and 16%, respectively (Wu, 1996; Li, 2003).

The main objectives of housing reforms, which began in the mid 1980s, have been privatization, commoditization, and promotion of rental markets. These goals represent important prerequisites for regional labor mobility, because, without markets for housing rentals and sales, workers can hardly detach themselves from the work units that provide housing, and thus can hardly achieve job changes. While the objectives of housing reforms were clear from the beginning, the progress of reform has been slow. Based on housing survey data collected in 1996, private housing was still very limited in Beijing and Guangzhou, two major cities in China (Li, 2003). In Beijing, only 3.3% of the residences were either rented or purchased through open market channels, while the percentage in Guangzhou was higher at 29.3%, but that was substantially lower than the rates of private housing in market economies. To speed up housing commercialization, the central government announced a major decision in July 1998: starting in the end of that year, public-sector enterprises would no longer engage directly in housing construction, distribution, and management; instead, the enterprises would provide urban

employees a cash subsidy for housing. Urban residents had a choice of either buying their apartments at competitive market prices with full property rights, renting the apartments at competitive market rates, or purchasing the apartments at heavily discounted prices with partial property rights--the right of use, but not sale (Wang and Murie, 2000). Many urban families chose the third option. Supplementing this major policy initiative, the State Council also advised local governments to build subsidized affordable housing to be sold or rented to low- and middle-income families.

Notwithstanding these major improvements in housing markets, significant barriers to labor mobility persist. Residential mobility is still not feasible for a high percentage of the urban population. Those individuals and families who either bought public housing at heavily discounted prices or are renting units from public-sector employers would have difficulties to detach themselves from the current living arrangements in case of changes in employment. Without full property rights, many families have not yet received the ownership certificates or are not permitted to lease or sell their housing units. For renters, terminating current arrangements would imply giving up a stream of future cash subsidies for housing from the current employers, which may not be offered or guaranteed by future employers. Moreover, according to the *Regulation on Affordable Housing* jointly issued by four ministries of the government, families with affordable housing arrangements are under various restrictions to resell their housing units in the market. Therefore, speeding up the pace of housing privatization and commoditization would have an effect of reducing the costs of labor mobility and thus helping integrate regional labor markets in China.

(3) *Deepening hukou reforms.* The household registration (or *hukou*) system, which aimed to control labor mobility across the rural and urban sectors, was formally established by the Chinese government in 1958, with the issuance of *Regulations on Household Registration of the PRC*. According to the regulation, *hukou* designates a person's legal place of residence and work at the time of his or her birth based on the locality of the mother's registration. Possession of the appropriate *hukou* (e.g. agricultural versus nonagricultural) also has implications for one's access to various amenities and social services such as health care, schooling, pensions, and until the early 1990s, rationed or subsidized food products, which were provided only to urban residents. Despite a series of policy reforms that have relaxed *hukou* restrictions since the inception of reform, and the fact that rural migrants working temporarily in cities increased to 98.3 million in 2003 (Cai, Park, and Zhao, 2004), *hukou* system continues to be a major barrier to rural-urban migration (Chan and Zhang, 1999; Fleisher and Yang, forthcoming).

From the perspective of urban labor markets, *hukou* system is still an obstacle to flexible labor movement because of its effects on migration costs, residential mobility, as well as job availability. For instance, in order to work in cities, rural migrants are required to have approval of government offices from both home and receiving localities. The formal procedure often requires five to six permits, and each may involve a charge, thus raising the costs of migration. To promote local employment, governments often require firms to give priority to city residents in job recruiting. It is common that local governments apply a quota system in hiring and controlling migrant workers, and that migrants are often permitted to work only in specific occupations with poor working

conditions, low pay, and job insecurity (Cai, 2003). Moreover, applications for housing loans, participation in the market for old apartments, and the eligibility for affordable housing all require local residency (Wu and Wang, 2002). The lack of local *hukou* also subjects the migrants to high costs of education for their children. Although national and local laws require that the municipality of residence (whether or not one's *hukou* grants permanent residence rights) is responsible for providing nine years of primary schooling for each child, in practice this right is often denied. The result is that migrant families must pay substantially higher fees to have their children admitted to the regular school system. It is clear that these policy and institutional impediments with *hukou* management have continued to impose distortions on the labor market. Consequently, removing these impediments to labor mobility is crucial for improving the efficiency of local labor markets.

(4) *Eliminating local protection.* From large cities such as Beijing and Shanghai to the much smaller county-level cities, local governments often use their power to implement discriminatory employment regulations in China. While regional policies often require giving employment priority to city residents, firms also pay much higher wages to local workers than migrants with comparable productivity-related characteristics. Recently, the Development Research Center of China's State Council conducted a nationwide survey of rural and urban enterprises on local protection (DRC, 2003). In regard to the forms of protection frequently used by regional authorities, "intervening in the labor market" tops the long list of 42 varieties. More specifically, this practice takes the form of "giving priority to employing local citizens," and 57.7 percent of the enterprises surveyed indicate that their local governments engage in such practices.

Indeed, labor market discrimination based on legal residency of workers is rather prevalent in China.

If local protectionism is to be reduced and ultimately eliminated, the central government must understand the incentives that local governments need to acquiesce to nationwide laws and regulations. From the perspective of political economy, local protectionism may find its causal root in the current evaluation system of government performance in which the central leadership of the party places a heavy emphasis on political stability. Local authorities choose to protect the employment and earnings of their permanent residents within the constituency, because doing so may maximize the support from local residents in order to maintain political stability. Local governments give much less weights to the welfare of migrants because they do not have legal rights to work and live in cities; their opposing views to policies can be easily suppressed.

In this regard, there is a serious need for research to identify relevant interest groups and the objectives of local governments, and to know who are the potential winners and losers from reducing protection. The central government should be prepared to compensate losers appropriately to overcome resistance to existing and new laws and regulations. Only by understanding the answers to these questions can incentive compatible rules be designed that will induce the desired responses from the involved parties. Similar analysis should also apply to pension, housing, and *hukou* reforms. It is hopeful that the benefits derived from successful policy reforms would provide incentives for all parties to implement the new rules and promote more efficient labor market institutions.

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Figure 1: Dispersion of Estimated Log(wages) for Basic Labor across Chinese Cities: 1988 and 1995

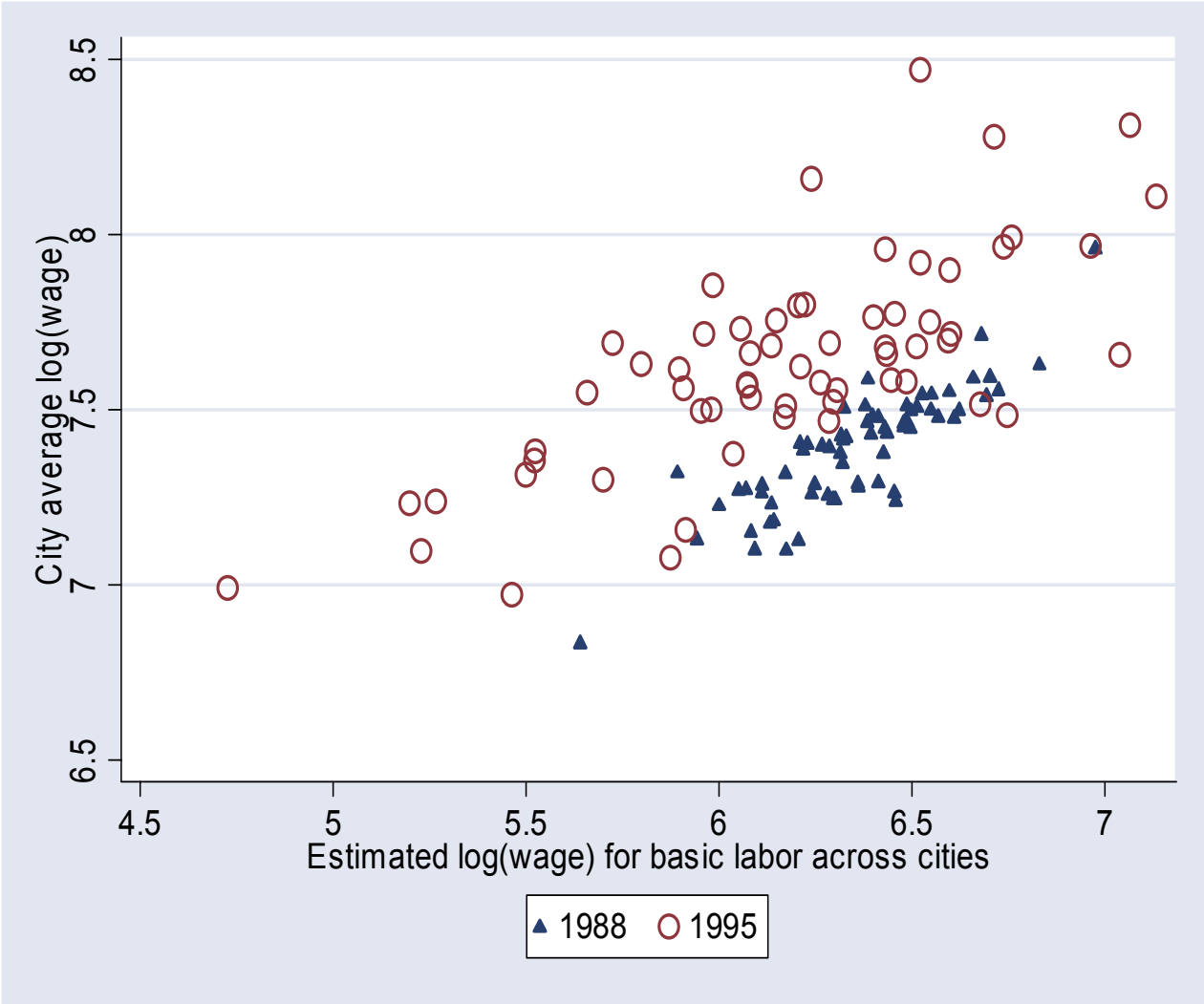


Figure 2: Dispersion of Estimated Rates of Return to Education across Chinese Cities: 1988 and 1995

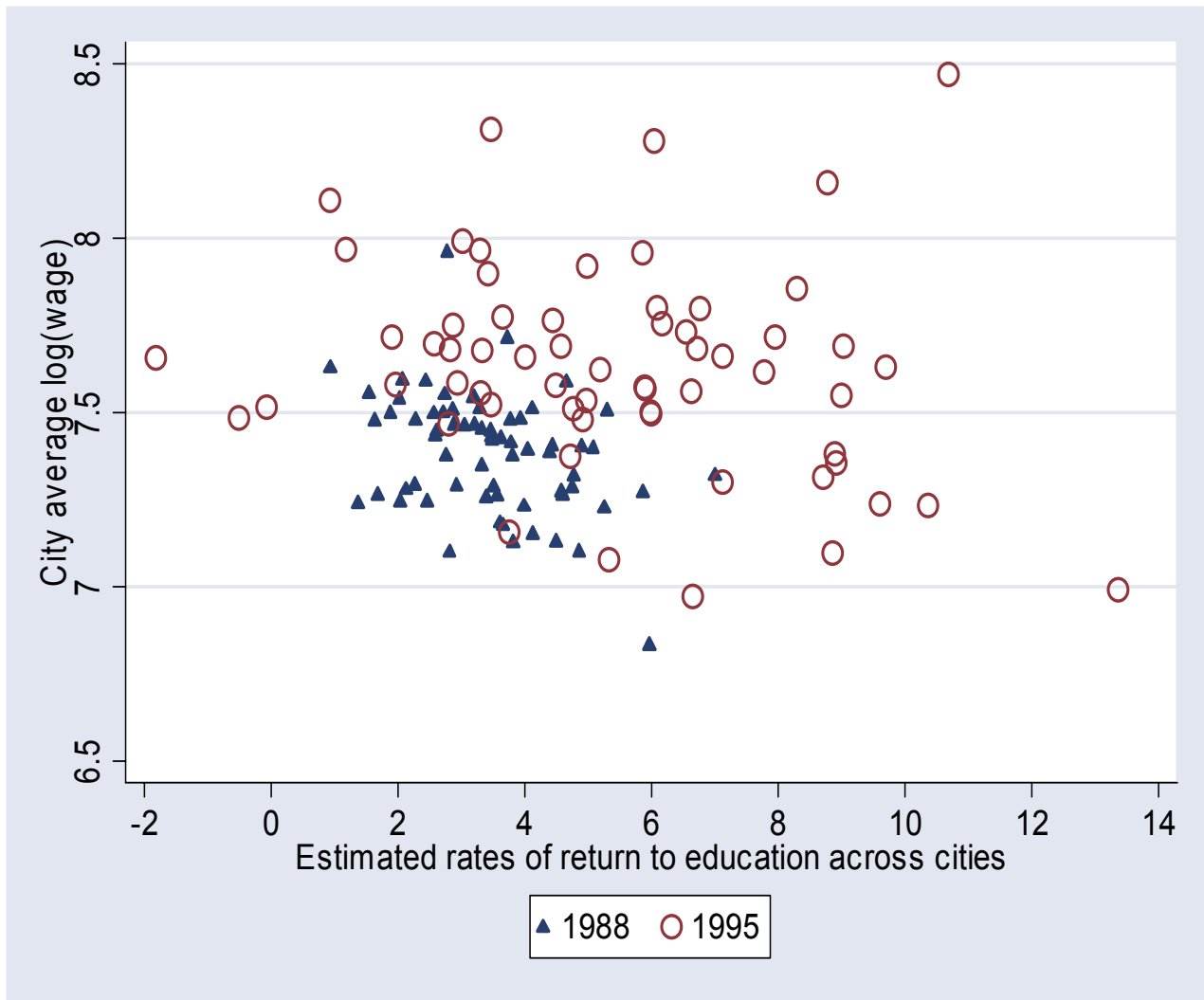


Figure 3. Convergence of Wage across Chinese Cities:
1988 Wage and Wage Growth Rate, 1988-1995



Table 1: Worker Earnings and Distributions by Province

| | 1988 | | | | 1995 | | | | Cities in 1988-95 panel (9) |
|--------------|----------------|----------------|---------------|----------------|----------------|----------------|---------------|----------------|--------------------------------------|
| | Mean | Adjusted mean | No. of cities | No. of workers | Mean | Adjusted mean | No. of cities | No. of workers | |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | |
| Whole sample | 1927 (1034) | 1827 (912) | 67 | 17074 | 2812 (1712) | 2574 (1412) | 62 | 9627 | 29 |
| Beijing | 2052 (734) | 2124 (760) | 1 | 833 | 3797 (1643) | 3383 (1464) | 1 | 802 | 1 |
| Shanxi | 1667 (1220) | 1555 (1138) | 8 | 1830 | 2198 (1119) | 2004 (1021) | 8 | 1032 | 4 |
| Liaoning | 1844 (618) | 1899 (636) | 4 | 1842 | 2487 (1232) | 2468 (1223) | 4 | 1185 | 3 |
| Jiangsu | 1906 (625) | 1887 (619) | 8 | 2231 | 3026 (1472) | 2810 (1367) | 9 | 1199 | 5 |
| Anhui | 1758 (1061) | 1888 (1140) | 8 | 1693 | 2195 (1098) | 2293 (1148) | 6 | 792 | 3 |
| Henan | 1555 (709) | 1492 (680) | 8 | 1912 | 2120 (1061) | 2154 (1079) | 8 | 912 | 4 |
| Hubei | 1767 (728) | 1737 (716) | 9 | 1887 | 2652 (1179) | 2377 (1057) | 7 | 1167 | 0 |
| Guangdong | 2800 (1598) | 2039 (1164) | 8 | 1968 | 5089 (3040) | 3844 (2296) | 8 | 869 | 5 |
| Yunnan | 2027 (848) | 1931 (807) | 9 | 1765 | 2563 (1082) | 2418 (1021) | 8 | 1079 | 4 |
| Gangsu | 1907 (1088) | 1906 (1088) | 4 | 1113 | 2084 (927) | 2037 (906) | 3 | 590 | 0 |

Note: Mean earnings are in 1988 Yuan with 1995 earnings deflated by official urban consumer price index. Adjusted mean earnings take into account spatial differences in purchasing power. Standard errors are in parentheses.

Table 2: Variable Means and Standard Deviations

| Variable | 1988 | 1995 |
|--|----------------|----------------|
| Log Earnings (yuan) | 7.4 (0.4) | 7.7 (0.7) |
| Personal Characteristics: | | |
| Schooling (years) | 10.7 (2.9) | 11.8 (2.6) |
| Experience (years) | 20.5 (11.0) | 20.9 (10.1) |
| Sex (% of male) | 52.8 (49.9) | 53.6 (49.9) |
| Communists (% of party members) | 24.0 (42.7) | 26.1 (43.9) |
| Ethnicity (% of minority) | 3.7 (18.9) | 4.6 (21.0) |
| City-Level Variables: | | |
| Skilled labor force (% , schooling level > lower middle school) | 49.3 (50.0) | 66.2 (47.3) |
| State sector (% , workers in state-owned and local public firms) | 79.4 (40.4) | 83.3 (37.3) |
| Openness (% , workers in foreign-owned and joint-venture firms) | 0.3 (5.4) | 0.8 (8.9) |
| Job search (% , workers found jobs through market channels) | – | 13.0 (33.6) |
| Information infrastructure (% , households with telephones) | 4.9 (21.7) | 41.8 (49.3) |

Table 3: Estimated Mincer Models

| Independent variable | 1988 | | | 1995 | | |
|----------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Schooling | 0.0389 (0.0010) | 0.0323 (0.0010) | – | 0.0718 (0.0029) | 0.0606 (0.0031) | – |
| Schooling × cities | – | – | yes | – | – | yes |
| Experience | 0.0418 (0.0013) | 0.0414 (0.0014) | 0.0446 (0.0020) | 0.0753 (0.0037) | 0.0745 (0.0038) | 0.0700 (0.0037) |
| Experience squared | -0.0005 (0.0000) | -0.0006 (0.0000) | -0.0006 (0.0000) | -0.0014 (0.0001) | -0.0015 (0.0001) | -0.0014 (0.0001) |
| Male | – | 0.0969 (0.0061) | 0.1109 (0.0074) | – | 0.1569 (0.0141) | 0.1647 (0.0133) |
| Party member | – | 0.0772 (0.0068) | 0.0828 (0.0082) | – | 0.1125 (0.0160) | 0.1309 (0.0153) |
| Minority | – | 0.0105 (0.0135) | 0.0431 (0.0232) | – | -0.0472 (0.0302) | -0.0193 (0.0336) |
| City dummies | – | – | yes | – | – | yes |
| Constant | 6.4296 (0.0184) | 6.4591 (0.0192) | – | 6.0116 (0.0520) | 6.0801 (0.0548) | – |
| R-squared | 0.2690 | 0.2886 | 0.4072 | 0.1553 | 0.1743 | 0.2991 |
| F-statistics | 1520.78 | 942.07 | 72.73 | 391.997 | 248.52 | 32.33 |
| Degree of freedom | (3,17033) | (6,17030) | (139,16897) | (3,9623) | (6,9620) | (128,9498) |

Note: Huber-White standard errors are reported in parentheses, which correct for heteroscedasticity of an unspecified form.

Table 4: Dispersion in Estimated Wages and Rates of Returns
to Education across Chinese Cities

| Measures of dispersion | Log (wage) | | Rates of return | |
|--------------------------|------------|-------|-----------------|--------|
| | 1988 | 1995 | 1988 | 1995 |
| Mean | 6.357 | 6.180 | 0.035 | 0.054 |
| Lowest | 5.641 | 4.729 | 0.009 | -0.018 |
| Highest | 6.975 | 7.136 | 0.070 | 0.134 |
| Standard deviation | 0.230 | 0.482 | 0.012 | 0.029 |
| Coefficient of variation | 0.036 | 0.078 | 0.343 | 0.542 |
| GINI coefficient | 0.020 | 0.043 | 0.191 | 0.302 |
| Number of cities | 67 | 62 | 67 | 62 |