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Journal of Comparative Economics 33 (2005) 730–752
Journal of COMPARATIVE ECONOMICS
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Economic returns to schooling in urban China, 1988 to 2001

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Received 10 December 2003

Available online 22 August 2005

Zhang, Junsen, Zhao, Yaohui, Park, Albert, and Song, Xiaoqing—Economic returns to schooling in urban China, 1988 to 2001

This study provides estimates of the returns to schooling in urban China over an extended period of economic reforms. We find a dramatic increase in the returns to education, from only 4.0 percent per year of schooling in 1988 to 10.2 percent in 2001. Most of the rise in the returns to education occurred after 1992 and reflected an increase in the wage premium for higher education. The rise is observed within groups defined by sex, work experience, region, and ownership, and is robust to the inclusion of different control variables. The timing and pattern of changing schooling returns suggest that they were influenced strongly by institutional reforms in the labor market that increased the demand for skilled labor. *Journal of Comparative Economics* **33** (4) (2005) 730–752. Chinese University of Hong Kong, Shatin, NT, Hong Kong; China Center for Economic Research, Peking University, Beijing, China; 238 Lorch Hall, 611 Tappan Street, University of Michigan, Ann Arbor, MI 48109-1220, USA.
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JEL classification: J24; J31; P23

Keywords: Economic returns to schooling; Urban China

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doi:10.1016/j.jce.2005.05.008

1. Introduction

In recent years, China has experienced a rapid rise in income inequality. Park et al. (2004) and Knight and Song (2003) assert that rising returns to education seem to be an important part of the story.[1] This rise in the returns to education deserves special attention. For at least a decade following the economic reforms initiated in the early 1980s, scholars have found unusually low returns to schooling in China, in both the state-dominated urban economy and among rural households, compared with other countries at a similar stage of development. If confirmed, this new development represents a significant change in China's economic and social systems and has important implications for the dynamics of economic and human development.

Returns to education provide important information about the incentives for human capital accumulation, the efficiency of resource allocation, and the distributional consequences of differences in human capital.[2] This paper has three objectives. First, we evaluate past studies of the returns to education in China to establish the fact that returns to education were low in the 1980s and early 1990s. Second, using a repeated cross-sectional data set, we estimate wage equations and demonstrate a rapid increase in the returns to education in urban China from 1988 to 2001. We verify the robustness of this trend by examining the sensitivity of our results to various specifications of the regression models and the inclusion of different control variables. We examine changes in the returns to education within gender, experience, ownership and regional groups. These results provide insights into the nature of labor market changes and possible causes of the increase in returns to schooling. Finally, we assess the extent to which supply and demand factors, especially institutional reforms, can explain the increasing trend in the returns to education.

In the next section, we briefly discuss the evolution of China's labor market institutions, especially those likely to affect wage determination. In Section 3, we provide a comprehensive review of past research on the returns to education in urban China. In Section 4, we describe our data and present descriptive statistics for our sample. Estimates of the returns to schooling are presented in Section 5. Section 6 examines the causes of the increase in the returns to schooling and Section 7 concludes with policy implications for the labor market in China.

2. Labor market institutional background in urban China

State-directed labor allocation was an integral part of the system of economic planning instituted in the mid-1950s. With the paramount goal of rapid industrialization, the government set the wages of workers at relatively low levels in order to reduce labor costs, and labor allocation decisions were centralized into the hands of economic planners. Low wages were made possible by state-subsidized food prices and state provision of non-wage

[1] Using the same data set, Park et al. (2004) find that, from 1988 to 2001, the Gini coefficient increased from 0.242 to 0.372 and the Theil entropy measure increased from 0.101 to 0.235.

[2] Heckman (2003) argues that China spends too little on human capital investment and too much on physical capital based on the differences in the returns to human and physical capital.

benefits to workers and their families, such as housing, child care, medical insurance, and pensions.

Under the planning system, all workers and employers were matched to jobs by government labor bureaus. Lifetime employment was guaranteed, but little labor mobility was permitted, either geographically or across occupations. From the late 1950s to the late 1970s, the Bureau of Labor and Personnel centrally determined and controlled the wages of all workers in urban areas through a grade system. Eight distinct grade levels for factory workers and technicians and 24 levels for administrative and managerial workers were specified. Wage increases were based on seniority rather than productivity. Although the wage scale permitted wage differentials by level of completed schooling, these differentials were very small. At the same time, the government effectively eliminated most of the direct private costs of education by waiving all tuitions and fees for college students and by providing living stipends to students from poor families.

By the late 1970s, the heavy hand of planners had led to poor effort incentives, which depressed productivity, smothered innovation, and led to widespread resource misallocation. This dire situation prompted Deng Xiaoping's new leadership to reform the economy beginning in the early 1980s. Sweeping rural reforms ended collective farming, returning land to individual households to manage. This greatly improved work incentives, leading to rapid productivity and income growth in rural areas. However, urban reforms proceeded very slowly until the middle and late 1990s, as the state balanced its objective of improving economic efficiency with the need to maintain political commitments of welfare guarantees to urban workers.

The first stage of the urban wage reforms made it possible for larger income differences to arise among workers by allowing profitable firms to pay higher salaries and letting employers pay bonuses to more productive workers. In October 1984, the Communist Party passed the "Resolution on Economic Institutional Reform," which changed the total wage quota system, under which planners fixed each enterprise's total wage bill, to a floating total wage system in which an enterprise's total wage bill reflected its profitability (Dai, 1994).

Employment reforms also sought to end the system of permanent employment. In 1986, the State Council issued "Temporary Regulations on the Use of Labor Contracts in State-Run Enterprises," and formally introduced labor contracts to the labor market (Meng, 2000). Contract workers accounted for 4 percent of total employment in 1985 during the system's experimental stage, but this proportion increased to 13 percent in 1990 and 39 percent in 1995. By 1997, one hundred million employees had signed labor contracts with their employers. In practice, the labor contract system was more successful on the hiring side than on the firing side. Firms were free to select and hire suitable workers; however, until the late 1990s, the government restricted the no-fault dismissal of workers. Nonetheless, more freedom in hiring increased the competition for productive workers.

The extent of labor market competition among state-owned enterprises is difficult to evaluate. Most workers who quit state-owned enterprises voluntarily moved to the non-state sector. Since the early 1990s, non-state enterprises, including foreign, private, and mixed ownership enterprises, have emerged as prominent players in the labor market. By competing aggressively with the public sector, these firms have rejuvenated the labor market and provided an impetus for state-sector restructuring.

3. Prior studies

Using micro data sets from China, economists have estimated Mincer-type earnings equations. Byron and Manaloto (1990) estimate a low rate of return of 1.4% for each additional year of schooling in China using data from a 1986 survey of 800 state industrial workers in Nanjing. Using state-sector data in the 1980s, Meng and Kidd (1997) find slightly larger but still low returns to education of 2.5% in 1981 and 2.7% in 1987. Fleisher and Wang (in press) use retrospective data collected in 1994 and find that returns to schooling did not recover from their low level during the Cultural Revolution until the 1990s. Several studies using rural data also find low returns to education during this period.[3] Although the estimates are not directly comparable due to differences in specifications and contexts, the consistently low values are in stark contrast to the findings of Psacharopoulos (1992) that the returns to schooling estimated using Mincer-type models in developing countries averaged 8% and the rate of return in Asian countries, excluding China, averaged 11%. Fleisher et al. (in press) conclude that China is an outlier in that its rapid economic growth is associated with returns to schooling remaining below the world average for comparable countries.

Low returns to education do not necessarily imply that education has no value. If better educated workers are paid less than their marginal product or if education has positive externalities, e.g., by improving the productivity of others or by leading to better governance, the social return to education will exceed the estimated private returns. Using firm-level data, Fleisher and Wang (2004) find that the wages of educated workers were well below their marginal product, due to the monopsony power of state employers. The argument that the social returns to education are high in China is also supported by studies using aggregate data, e.g., Fleisher and Chen (1997), Demurger (2001), and Chen and Feng (2000). Finally, education can be important in determining who gets access to wage employment even if it does not greatly influence the level of wages. Zhao (1997) finds that education provides better access to higher-paying urban jobs for rural people.

The most widely-used household data for estimating the returns to education in China are the two waves of the Chinese Household Income Project (CHIP) conducted in 1988 and 1995. Different authors use different earnings equation specifications; thus, a range of estimates is generated. Maurer-Fazio (1999) uses the urban sample of the 1988 CHIP data and estimates that the returns to schooling were 2.9 and 4.5% for male and female workers, respectively. She also finds that the returns were higher for younger workers, i.e., those under age 30 at 6.6%, and for the employees in the non-state sector at around 9%. However, she finds no clear evidence to support her hypothesis that developed coastal regions have

[3] deBrauw and Rozelle (2004) present a nice summary of past studies of the returns to schooling in rural China. From a survey of farm households in four counties, Feder and Lau (1991) find that only one of the counties showed significantly positive returns to education. Using rural household survey data collected in 1990, Yang (1994) finds that schooling had weak effects on farm income. In addition, the effect on non-farm income was 2.6% in Zhejiang province, but not statistically significant in Sichuan province. Zhao (1995) analyzes farm household incomes in a suburban county in Beijing from 1979 to 1986 and also concludes that schooling of neither farm nor non-farm workers had a significant effect on family income. Li and Zhang (1998) report that the schooling return was negative or zero under collective farming in 1977; however they find a positive return of about 3.3% under household farming in 1990.

higher rates of return to education than less developed interior regions. Using the same 1988 CHIP data, Johnson and Chow (1997) estimate several specifications with and without interaction terms between gender and schooling and between gender and experience for both rural and urban sub-samples and for the pooled sample. The rates of return ranged from 2.8 to 4.0% and were not very sensitive to the inclusion of interaction terms. These authors conclude that the rates of return were fairly low compared with similar estimates for other countries. Using the 1988 CHIP data, Liu (1998) finds a 3.6% rate of return to a year of schooling. Taking an alternative specification with dummy variables for different education levels, he estimates rates of return relative to no education of 37.5% for university education, 19.1% for secondary education, and 7.5% for primary education. Liu (1998) also considers differences in the returns to schooling among experience groups and across provinces. He finds that older workers had lower returns to education and that Guangdong had higher returns than other provinces. Other studies using the CHIP 1988 data include Knight and Song (1991, 1993, 1995) who examine income inequality and wage structure, and Gustafsson and Li (2000) who examine gender wage gaps. The returns to education in these studies are uniformly low.

Scholars have also searched for evidence of increasing returns to education over time following the progress of economic reforms. Comparing the CHIP 1988 sample and the 1992 Chinese Labor Market Research Project (CLMRP) sample, Maurer-Fazio (1999) finds that the returns to a year of schooling increased by 0.8 percent for male workers and 0.4 percent for female workers, but that schooling returns for workers under age 30 were lower in 1992 than in 1988. The availability of a second wave of CHIP data for 1995 led to a new set of estimates of the returns to education. Gustafsson and Li (2000) find a substantial rise in the returns to 4-year college education relative to high school education for male workers, from 8.9% in 1988 to 15.5% in 1995. Using a similar specification but combining the male and female samples, Knight and Song (2003) find that the returns to college education, relative to high school, rose from 4.9% in 1988 to 15.0% in 1995. Yang (in press) shows that, on average, the rates of return to education at the city level increased from 3.1 to 5.1% over this seven-year period and the dispersion widened significantly.

One advantage of 1995 CHIP data over the 1988 CHIP data is that information on working hours was collected to make it possible to test whether the previous low returns to education were due to measurement error in earnings. H. Li (2003) finds that the returns to education were higher using hourly wage rates because highly educated people worked fewer hours on average. However, the underestimation is less than 10 percent. Using hourly wages, the returns to schooling were 5.5% whereas, using annual earnings, the returns to schooling were 5.0%.

H. Li (2003) makes some between-group comparisons in the returns to schooling. Similar to results using the 1988 CHIP data, he finds that the returns to education were highest for the youngest cohort. He classifies workers into three cohorts depending on when they started working prior to economic reform, up to 1979, in the early stage of urban reforms, 1980 to 1987, or during the advanced stage of urban reform, 1988 to 1995. The average annual rates of return to college education were 7.7% for the pre-1979 cohort, 14.1% for the 1980–1987 cohort, and 14.8% for the 1988–1995 cohort. Interestingly, the rates of return were higher in a less-developed province, Gansu, than in a high-income province,

Guangdong. This result contrasts with the one reported by Liu (1998) using the CHIP 1988 data.

Most urban studies use a single year of data, and, due to differences in specifications of earnings functions, comparing the results across studies is problematic. The existing studies that use comparable data and consistent specifications over time, e.g., Gustafsson and Li (2000) and Knight and Song (2003), do not focus primarily on the returns to education. Hence, no information is provided on the robustness of the results or on between-group comparisons. Furthermore, these studies use data from only two points in time so that inferences about the trend may be influenced by transitory disturbances. In this paper, we utilize annual micro data covering the entire period from 1988 to 2001 to document the trends in schooling returns.

4. Data

The data used in this paper come from fourteen consecutive annual surveys of urban households conducted by China's National Bureau of Statistics from 1988 through 2001.[4] One undesirable feature of China's urban household surveys during this period is that migrant households living in urban areas without an urban household registration (*hukou*) were not included in the surveys. However, the exclusion of migrants allows us to restrict our attention to a relatively fixed group of people, which may enable us to document better the effect of economic changes on wage determination.

We use data from six provinces that are broadly representative of China's rich regional variation, namely, Beijing, Liaoning, Zhejiang, Sichuan, Guangdong and Shaanxi. Beijing is a rapidly growing municipality in the north; Guangdong and Zhejiang are dynamic high-growth provinces in China's south coastal region; Liaoning is a heavy industrial province in the northeast; Sichuan and Shaanxi are relatively less developed provinces located in the southwest and northwest, respectively. The sample distribution by province and some summary statistics by year are presented in Table 1. The sample each year consists of about six thousand individual workers.

To focus on wage determination in the labor market, we restrict our sample to workers engaged in wage employment. Following standard practice, we exclude employers, self-employed individuals, retirees, students, and household workers (Coleman, 1993; Mwabu and Schultz, 1996).[5] Moreover, as China's Labor Law sets the minimum working age at 16,

[4] The urban household survey is carried out by the Urban Survey Organization (USO) of the National Bureau of Statistics; it covers 146 cities and 80 towns. The choice of cities and towns and also households is based on the principle of random and representative sampling. USO (2001) provides details on the data. To assess the representativeness of the data, we compare several variables that are both available in our data and in the Statistical Yearbook of China. For 1988, our sample averages for household size, the number of workers in a household, and per capita household income are 3.7, 2.2 and 1352, and the corresponding national averages are 3.6, 2.0 and 1192 (China State Statistical Bureau, 1989, p. 726). In 2001, our sample averages for the three variables are 3.2, 1.8 and 7763, compared with national averages of 3.1, 1.7 and 6907 (China State Statistical Bureau, 2002, p. 321). Thus, the sample averages are reasonably close to those reported in the statistical yearbooks.

[5] Following common practice, we also exclude individuals who earn less than half of the minimum wage under the assumption that such individuals are not full-time workers. Using data on official minimum wages for each

we exclude all those younger than 16. Because most workers retire by age 60 in accordance with China's mandatory retirement age, individuals older than 60 also are excluded. Wage income consists of four major components, namely, basic wage, bonus, subsidies and other labor-related income. As Table 1 reports, mean monthly earnings rise steadily and more than double from less than 2000 yuan in 1988 to over 5500 yuan in 2001, measured in 1988 yuan. Reflecting China's general demographic trends, the average age of the working population increased by 2.8 years, from 37.2 in 1988 to 40.4 in 2001. In addition, the proportion of females in the work force declined gradually from 49% in 1988 to 45% in 2001.

About three quarters of all workers are employed in the state-owned sector. Although this ratio did not change much between 1988 and 2001, an upward trend is observed during the first half of the data period, reaching 78.5% in 1996, followed by a downward trend thereafter. The shrinkage of state-sector employment coincided with the restructuring of state-owned enterprises and the layoffs of millions of state-sector workers. In comparison to the state sector, the decline in employment in collective enterprises has been more dramatic and consistent. Between 1988 and 2001, the share of workers in the collective sector declined by almost half, from 24.8% in 1988 to 10.9% in 2001. The other ownership category consists of private enterprises, self-employed individuals, foreign funded enterprises, and share-holding corporations that may have been spun off from the state and collective sectors. This sector enjoyed rapid growth in employment; in 1988, its share was less than 1% but, by 2001, its share rose to 19.0%. The fastest increase occurred after 1991, following Deng Xiaoping's tour to the South in which he promoted openness and reform.

As reported in Table 2, mean years of schooling, increase from 10.4 years in 1988 to 11.8 years in 2001.[6] Despite this somewhat small increment, dramatic changes in the structure of education occurred. Most noticeable are the more than doubling of the proportion of workers with college education and the decline by two thirds in the number of workers with primary school education or less. The share of junior high school graduates also shows a sizeable decrease during the period, from 42% in 1988 to 25.1% in 2001. The decline in the share of workers in the low education categories is due primarily to the retirement of older, less-educated cohorts and the entrance into the workforce of younger, better-educated workers.

Two caveats concerning data limitations are in order. First, our data do not have information on working hours. Hence, labor market participation may be distributed unevenly among workers of different educational levels. If less educated workers are more likely to be unemployed for parts of the year or work fewer hours in recent years, we may overestimate both the level and rate of increase of the returns to education. However, the evidence from the CHIP data suggests that using hourly wages increases slightly the estimated re-

province from 1988 to 2001, we calculate the ratio of the minimum wage to mean income for each province-year. Then we take the mean share to estimate minimum wages for all province-years and use these values to exclude individuals.

[6] The survey data include only information on the level of schooling attained. To construct a measure of years of schooling, we assume the following years of schooling for different levels of education: primary school—6 years, middle school—9 years, high school—12 years, technical school—15 years, and college or above—16 years.

Table 1
Sample size and distribution across provinces in urban China, 1988–2001

Year	*N*	Beijing (%)	Liaoning (%)	Zhejiang (%)	Guangdong (%)	Shaanxi (%)	Sichuan (%)	Annual earnings (1988 yuan)	Male (%)	Age (years)	State-owned unit (%)	Urban collective (%)	Non-public enterprises (%)
1988	6087	10.3	27.3	11.0	21.1	8.4	21.9	1910.7	51.1	37.2	74.5	24.8	0.7
1989	5615	8.9	26.2	11.0	23.6	8.5	21.9	1868.2	51.8	37.4	75.2	23.8	1.0
1990	6194	9.2	26.9	10.6	23.5	8.5	21.3	2031.0	51.7	37.9	76.0	22.9	1.1
1991	6225	9.5	25.4	10.8	24.2	8.4	21.7	2186.2	52.1	37.8	77.2	21.8	1.1
1992	7853	9.7	24.9	10.6	23.4	8.4	23.1	2667.7	52.0	38.0	76.5	20.7	2.8
1993	7017	9.5	24.7	10.4	24.7	8.0	22.7	2942.7	52.2	38.3	76.1	20.4	3.5
1994	6752	9.2	24.2	10.2	25.8	7.9	22.6	3373.7	52.6	38.4	76.8	17.8	5.4
1995	6830	8.6	22.5	9.9	29.1	7.8	22.1	3606.4	52.6	38.6	78.0	15.4	6.6
1996	6651	8.9	22.4	10.4	26.7	8.1	23.6	3635.4	52.9	39.1	78.5	15.2	6.4
1997	6641	9.0	23.8	11.2	29.3	8.7	17.9	3910.8	52.9	39.4	77.4	14.9	7.7
1998	6331	8.9	22.9	11.8	29.9	8.8	17.7	4272.6	53.7	39.5	76.8	14.4	8.8
1999	6094	9.1	21.6	11.9	31.3	8.6	17.6	4837.3	53.6	39.6	74.0	14.0	12.0
2000	6197	9.7	22.0	11.9	30.7	8.5	17.1	5078.5	54.6	39.9	72.6	11.3	16.1
2001	5404	10.0	22.4	11.9	30.4	9.2	16.1	5510.0	55.0	40.4	70.2	10.9	19.0

Table 2
The distribution of schooling by years and levels, 1988–2001

Year	Schooling (years)	College and above (%)	Technical school (%)	Senior high (%)	Junior high (%)	Primary and below (%)
1988	10.4	12.6	11.8	22.6	42.0	10.5
1989	10.5	13.2	12.0	24.5	40.1	9.7
1990	10.6	14.1	12.8	24.3	39.5	9.0
1991	10.7	15.6	12.4	24.7	37.4	9.6
1992	11.0	18.2	13.3	26.2	34.8	7.4
1993	11.1	18.3	13.2	26.7	35.3	6.4
1994	11.3	20.4	14.1	27.1	32.9	5.2
1995	11.3	21.6	13.3	28.8	30.7	5.4
1996	11.3	22.1	13.7	28.1	31.2	4.7
1997	11.4	22.8	13.0	28.9	31.1	4.1
1998	11.5	24.5	14.2	29.1	28.3	3.9
1999	11.7	26.3	14.5	29.3	26.4	3.5
2000	11.8	28.9	13.2	30.3	24.1	3.4
2001	11.8	28.1	13.1	30.7	25.1	2.9

turns to education. Second, we are not able to account for labor earnings in non-wage benefits, such as housing, health care benefits and pensions. If non-wage benefits are positively or negatively related to wage earnings, this omission leads to either an under- or over-estimate of the returns to education.

5. Estimates of the returns to schooling

Following Mincer (1974), we estimate a semi-logarithmic specification for earnings given by:

$$\ln w_i = \beta_0 + \beta_1 Schooling_i + \beta_2 Experience_i + \beta_3 Experience_i^2 + \beta_4 Gender_i + Region_i' \beta_5 + u_i, \quad (1)$$

where w_i is annual earnings of individual i, *Schooling* is educational attainment measured as years of schooling or highest level of schooling achieved, *Experience* is a worker's years of potential labor market experience measured as age minus schooling minus six, *Gender* is a dummy variable capturing the wage differential between men and women, and *Region* is a set of five provincial dummy variables.

Table 3 reports the coefficients for the returns to education from the Ordinary Least Squares (OLS) estimation by year for Eq. (1). Detailed regression results for all variables, including standard errors, R-squared and sample sizes are reported in Appendix Table A. The first column in Table 3 presents coefficients for years of schooling. By this measure, the returns to a year of schooling more than doubled over the 14-year period, from 4.0% in 1988 to 10.2% in 2001. The returns at the end of the period are similar to those found in other developing countries for the early 1990s as summarized in Psacharopoulos (1994). Taking advantage of the annual data series, we observe that the schooling coefficient did

Table 3
Estimates of rates of returns to education in urban China, 1988–2001

Year	Years of schooling	College/above versus high school	Technical school versus high school	High school versus junior high	Junior high versus primary school
1988	4.0	12.2	3.1	11.0	13.9
1989	4.6	14.4	5.8	11.6	17.3
1990	4.7	16.6	9.9	11.5	12.8
1991	4.3	15.9	8.0	9.7	13.4
1992	4.7	20.1	9.2	9.8	10.8
1993	5.2	20.4	7.0	11.5	13.6
1994	7.3	28.7	15.3	14.5	20.2
1995	6.7	24.4	12.0	15.3	18.9
1996	6.8	25.2	10.4	15.6	14.9
1997	6.7	22.3	12.0	17.3	10.9
1998	8.1	32.1	16.5	16.2	12.2
1999	9.9	38.1	17.0	21.0	14.8
2000	10.1	38.7	16.2	20.5	16.4
2001	10.2	37.3	17.8	21.4	13.8

Notes. (i) The results are based on a basic Mincer equation with gender and regional dummy variables. (ii) The regressions are run separately for each year.

not rise in a linear fashion over the period. Rather, returns rose by 0.6 points between 1988 and 1989, stagnated between 1989 and 1992, and increased by 2.6 points from 1992 to 1994. For another 3 years returns fell before rising by 3.5 points from 1997 to 2001.

Using dummy variables for discrete levels of schooling, we capture non-linearities in the returns to schooling. Table 3 presents the marginal return to completing each additional level of education, e.g., junior high school compared to primary school or below and senior high school compared to junior high school. We compare technical schools with senior high school, but they could also be compared with junior high schools since some technical schools target junior high school graduates. The returns to each level of education beyond junior high school have risen substantially from 1988 to 2001.[7] For senior high school, the rate of return varied between 9.7% and 21.4%, increasing sharply in 1994 and 1999. The levels of education exhibiting the greatest rise in returns to schooling were technical school and college graduates. For senior high school graduates, the return to completing technical school increased from 3.1% in 1988 to 17.8% in 2001. College graduates earned 12.2% more than senior high school graduates in 1988, but 37.3% more in 2001.

In order to test the robustness of the estimated increasing trend in the returns to education and to investigate whether education wage premiums occur mainly within or between job categories, we add ownership, occupation, and industry variables to the Mincer equation and observe whether these additions change the estimated schooling coefficients. Often the inclusion of occupation and industry variables in wage regressions reduces the magnitude of schooling coefficients because of positive selection into high-paying industries and occupations by better-educated workers. In China, Zhao (2002) finds a similar positive selection into ownership categories, i.e., state and foreign ownership. For exposi-

[7] The return to completing junior high school relative to primary school fluctuates around 14%.

Table 4
Returns to education with various wage function specifications

Year	Ordinary Mincer	Add ownership	Add occupation	Add industry	Add all three
1988	4.0	3.3	2.6	4.0	2.3
1989	4.6	4.0	3.3	4.6	3.1
1990	4.7	3.8	3.0	4.4	2.7
1991	4.3	3.7	2.8	4.1	2.6
1992	4.7	4.1	2.8	4.5	2.5
1993	5.2	4.4	3.6	4.9	3.1
1994	7.3	6.3	4.8	6.3	4.0
1995	6.7	6.0	4.7	6.1	4.3
1996	6.8	6.0	4.9	6.0	4.4
1997	6.7	5.9	4.4	6.0	3.9
1998	8.1	7.3	5.5	6.9	4.9
1999	9.9	9.1	6.7	8.5	6.0
2000	10.1	9.4	6.9	8.8	6.6
2001	10.2	9.1	6.6	8.5	6.0

tional convenience, we use the continuous measure of educational attainment. Column 1 of Table 4 repeats the schooling coefficients from Table 3 for ease of comparison. Columns 2, 3 and 4 report schooling coefficients from regressions adding ownership, occupation, and industry dummy variables separately, and column 5 includes all simultaneously.

As expected, the returns to schooling are lower when additional job-related variables are added. Adding ownership dummy variables reduces the estimated returns to schooling by an average of about one percentage point. Adding industry dummies has a negligible effect on schooling coefficients in the beginning of the period but, by the end of the period, the effect is larger, reducing the returns to schooling by 1.5 percentage points. Hence, better-educated workers are increasingly being sorted into higher-paying industries. The effect of occupation on the returns to schooling is the largest of all three control variables; it reduces the schooling coefficient by about one third. Finally, when we include all three of the job-related variables in the regressions, the magnitude of the schooling coefficient falls by about 40% at both the beginning and the end of the period. However, the trend of increasing returns to education over time is robust to the inclusion of job-related control variables. Hence, we conclude that rising returns to education are occurring within highly specific work categories and reflect broad changes in the labor market.

Next, we use the Mincer equations to examine whether the changes in the returns to education differ systematically by gender, experience, ownership, and region. This analysis provides evidence on heterogeneity in the returns to education and sheds light on possible causes of the rising returns to education. Table 5 presents the returns to schooling for men and women, based on separate regressions for each gender. Using OLS to estimate the earnings equations, we find that the returns to schooling are higher for females throughout the period, exceeding the returns to male education by an average of about 60%. The finding of higher returns to female education is common in the literature as Psacharopoulos (1994) demonstrates. Using the CHIP data for 1988 and 1995, Gustafsson and Li (2000) and H. Li (2003) find a similar result. Deolalikar (1993) argues that men have a comparative advantage in physical strength so that schooling becomes relatively more important to women

Table 5
Returns to education and years of schooling by gender, 1988–2001

Year	Men		Women		Years of schooling	
	OLS	Heckman	OLS	Heckman	Men	Women
1988	2.9	2.8	5.2	5.2	10.8	10.0
1989	3.6	3.3	5.7	5.7	10.9	10.1
1990	3.6	3.5	5.9	6.0	11.0	10.3
1991	3.1	3.0	5.6	5.5	11.0	10.4
1992	3.7	3.7	5.9	5.8	11.3	10.7
1993	4.3	4.4	6.2	6.0	11.3	10.8
1994	6.2	6.2	8.9	8.8	11.5	11.0
1995	5.7	5.6	8.1	7.9	11.5	11.1
1996	5.9	5.8	8.0	8.2	11.5	11.1
1997	5.1	4.9	9.2	8.3	11.5	11.2
1998	6.6	6.4	10.3	9.2	11.6	11.4
1999	8.0	8.1	12.8	12.9	11.8	11.5
2000	8.6	8.6	12.5	10.9	11.8	11.7
2001	8.4	7.5	13.2	12.5	11.8	11.8

who focus on more skill-intensive jobs. H. Li (2003) points out that fewer women achieve high levels of education, which reduces the relative supply of highly skilled women.

Another possible explanation for the higher returns to female education is greater positive self-selection of women into the labor force relative to men, whose labor force participation is nearly universal. To test this hypothesis directly, we estimate Heckman selection–correction models of earnings, including household demographic variables to identify the selection equation, and report the results in columns 2 and 4 of Table 5.[8] For men, no significant differences are found in estimated returns after controlling for selection bias, except in the most recent year, 2001. Beginning in 1997, the returns to schooling are slightly lower for women after controlling for selection, by an average of 0.8 percent from 1997 to 2001. These results suggest that positive selection of women into the labor force evolved during the period of economic restructuring when older women were laid off in large numbers, as Giles et al. (in press) assert. Consistent with this selection story, in the estimated selection equation, the importance of education in predicting employment rose steadily over time for women, but remained the same for men. Trends in mean years of schooling, reported in columns 5 and 6 of Table 5, indicate that the gap between the average education level of working women and working men narrowed over time and became equal by 2001. However, this effect is not sufficient to explain the consistently higher returns to schooling for women, which occurred before 1997 and persist even after controlling for selection bias.

In terms of trends, both male and female workers experienced large increases in the returns to education. The absolute increase in the returns to education was higher for women at 8 percentage points for females relative to 5.5 percent for males. However, male workers

[8] The identifying variables are the shares of household members who are less than 7 years old, between 7 and 15 years old, or more than 60 years old.

Table 6
Returns to education by potential experience cohorts, 1988–2001

Year	1–10 years	11–20 years	21–30 years	31+ years
1988	6.0	4.0	3.9	3.5
1989	6.4	4.6	4.8	3.6
1990	6.8	5.8	4.0	3.9
1991	5.8	5.2	3.3	3.7
1992	6.8	5.4	4.3	3.5
1993	7.6	6.4	4.9	5.9
1994	11.0	7.4	6.9	5.5
1995	9.4	7.0	6.5	6.1
1996	8.5	8.9	5.6	5.1
1997	8.9	8.6	6.3	6.2
1998	10.3	10.2	7.7	7.4
1999	11.8	11.6	10.3	8.2
2000	12.8	11.6	10.0	7.6
2001	13.1	12.0	10.4	9.0

gained somewhat on female workers; the male/female ratio of educational returns increased slightly from 0.56 in 1988 to 0.64 in 2001.

Table 6 presents returns to schooling by potential experience cohorts; in general, these are higher for new market entrants. The longer one has been out of school, the lower are the returns to education. Possible explanations for this difference include a vintage effect, the rising quality of education, or greater mobility among younger workers because they have made fewer employer-specific investments. Older cohorts also are likely to be more constrained by wage compression and other restrictions of past employment arrangements. However, when we examine trends over time, we find that the rise in returns to education is not confined only to young cohorts. The returns to education have increased at similar rates for all experience groups, more than doubling for both the youngest and oldest experience cohort.

In Table 7 we consider returns to schooling by ownership type of workplace. Because the sample size for the non-public sector is very small in the earlier years, we interact the schooling variable with ownership dummies rather than run separate regressions. We find that the returns to education have been consistently higher for non-public enterprises. Even in 1988, the return to a year of schooling was 7.3 percent among those working in non-public enterprises. Beginning in 1993, the rate of return remained consistently above 10 percent per year of schooling, with no appreciable upward trend. In contrast, the returns to education within the state sector started low, but rose steadily from 3.0% in 1988 to 9.0% in 2001. For urban collectives, the rates of return increased from 4.2% in 1988 to 8.7% in 2000, before falling to 7.3 percent in 2001. Thus, the state-sector lagged behind the non-state sector but caught up to narrow the gap over time. This suggests that the wage-setting behavior in state and collective firms changed substantially over the course of China's economic reforms, perhaps in response to competition for skilled labor coming from foreign-funded firms and domestic private enterprises.

To examine provincial differences in the returns to education, we run separate regressions by province. As Table 8 indicates, large differences are found across provinces. For

Table 7
Returns to education by ownership, 1988–2001

Year	State sector	Collective enterprises	Non-public enterprises
1988	3.0	4.2	7.3
1989	3.7	5.0	9.4
1990	3.6	4.7	8.0
1991	3.7	3.4	7.8
1992	4.1	2.8	9.0
1993	4.2	3.7	10.6
1994	5.9	6.1	11.8
1995	5.5	6.5	9.8
1996	5.7	5.5	11.0
1997	5.7	4.8	10.0
1998	7.0	6.7	11.0
1999	8.9	8.4	11.3
2000	8.6	8.7	13.2
2001	9.0	7.3	10.0

Note. Returns are derived from pooled regression with interaction terms.

example, the returns to education in Shaanxi were more than twice as great as in Beijing in 1988. Moreover, until the late 1990s, the returns to schooling were lower in richer provinces, i.e., Beijing, Guangdong, Zhejiang and Liaoning, than in poorer provinces, i.e., Shaanxi and Sichuan. This difference was especially pronounced at the beginning of the period, although it declined over time. The large initial gap in the returns to education across provinces is not likely to be explained by regional differences in school quality because schools are generally better financed and of higher quality in rich provinces. Market demand and supply forces are not likely explanations because non-market forces, e.g., government regulation of wage-setting in the state and collective sectors, were still prevalent in the late 1980s.

Government units and state-owned enterprises paid their employees according to a nation-wide salary scale with slight adjustments for regional differences in the cost of living. Wages in urban collective enterprises were set approximately equal to wages in the state sector. Although economic reforms in the 1980s granted firms some autonomy in wage setting, government-determined wage scales were retained. However, wages were set entirely by market forces outside of the state and collective sectors. As late as 1996, workers with more schooling were more likely to work in the state and collective sectors than in domestic private enterprises according to Zhao (2002). As a result, the wages of more-educated workers were detached from local market conditions, but the wages of the less-educated individuals were more likely to be determined outside the state and collective sectors and reflect more closely local economic conditions. If market wages in poor areas were lower than in rich areas and state sector wages were comparable, this situation could explain our finding of higher returns to schooling in poor provinces. Another alternative explanation is a lower relative supply of educated workers in poor provinces. However, this is not consistent with the lack of significant differences in the mean years of schooling across provinces, which we report in the bottom panel of Table 8.

Reforms in the 1990s influenced relative wages in two important ways. First, wage-setting in the state-sector was made to comply more with market forces, which restrained

Table 8
Returns to education and years of schooling by province, 1988–2001

Year	Beijing	Liaoning	Zhejiang	Guangdong	Shaanxi	Sichuan
Returns to schooling						
1988	2.8	3.8	3.2	3.2	6.3	5.0
1989	1.6	4.1	3.6	4.7	5.9	5.6
1990	2.7	4.4	3.0	4.6	6.0	5.8
1991	2.3	4.5	3.7	3.5	5.3	5.3
1992	3.4	4.8	3.8	4.0	5.5	5.8
1993	4.1	5.4	3.8	4.1	6.1	6.6
1994	5.9	6.8	6.5	6.5	8.7	9.3
1995	4.9	6.9	4.4	6.5	7.9	8.1
1996	5.2	6.7	6.1	6.8	7.5	7.4
1997	4.3	6.9	7.1	7.0	6.4	7.2
1998	6.1	7.7	7.4	8.6	8.5	8.9
1999	8.8	10.0	8.4	10.5	10.3	10.3
2000	9.3	10.7	9.0	9.9	10.1	10.8
2001	10.5	8.1	10.9	10.5	9.5	12.3
Years of schooling						
1988	11.1	10.5	10.3	10.3	10.5	10.2
1989	10.7	10.7	10.3	10.5	10.6	10.5
1990	11.0	10.9	10.4	10.5	10.8	10.5
1991	11.7	10.7	10.7	10.4	11.2	10.5
1992	11.5	10.9	11.0	11.0	11.4	10.8
1993	11.8	10.9	11.0	11.1	11.5	10.7
1994	11.9	11.1	11.3	11.3	11.5	10.9
1995	11.9	11.2	10.9	11.4	11.6	11.1
1996	11.9	11.2	11.0	11.6	11.6	11.1
1997	11.8	11.2	10.9	11.8	11.5	11.2
1998	11.8	11.3	11.1	11.8	11.8	11.5
1999	11.9	11.5	11.2	11.8	11.9	11.8
2000	11.8	11.8	11.2	12.1	12.0	11.6
2001	12.0	11.7	11.4	12.1	12.0	11.4

Note. Returns are derived from separate regressions.

wage growth in the state and collective sectors in less-developed provinces. Second, wages in the private-sector in rich provinces increased rapidly with more rapid reform, growth, and the influx of FDI. These institutional changes should lead to convergence in the wage-setting behavior of the public and private sectors and reduce the gap in returns to education across provinces. As Table 8 indicates, the returns to education in both rich and poor provinces have increased rapidly and the returns in rich provinces have caught up to those in poor provinces over time.

6. Explaining rising returns to education

The most obvious explanation for the steady increase in the returns to schooling in urban China is that, as a transition economy, China moved from a system of government-set wages, which compressed wage scales, to a more market-oriented system. This process

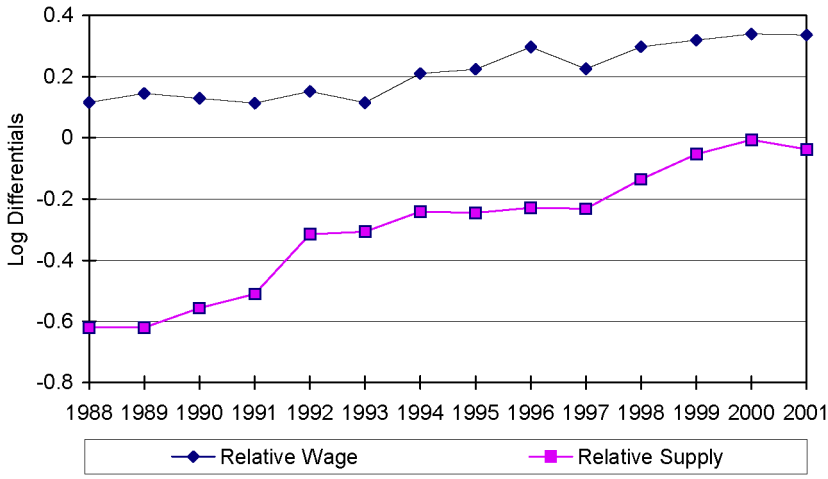

Fig. 1. Relative wage and relative supply of college versus high school graduates.

made workers' earnings reflect more their productivity and, hence, resulted in increases in returns to education. However, other dramatic changes in China occurred in the 1990s. Supply and demand factors affecting the returns to education include changes in the relative supply of educated workers, the changing composition of the labor force as retiring cohorts were replaced with younger workers over time, skill-biased technological change, and globalization of the economy, i.e., international trade and FDI. In this section, we investigate the importance of these different explanations for rising returns to education.

The evidence presented in Table 2 indicates that the relative supply of more-educated workers has not been falling so that this supply consideration cannot explain rising returns to education. The average years of schooling for wage-earners in our sample increased from 10.4 years in 1988 to 11.8 years in 2001. Most strikingly, the share of workers with a college education or above increased from 12.6 to 28.1 percent, even as the wage premium for higher education relative to high school increased dramatically from 12.2 to 37.3 percent. Figure 1 plots the relative wage and relative supply of college versus high school workers and shows that the relative supply has increased even faster than relative wages.[9] Hence, changes in relative demand must have been substantial enough to increase the returns to schooling despite the increase in relative supply.

Younger workers entering the labor force are both more skilled and have higher education, while retiring workers are less skilled and poorly educated. Thus, for any given age group, the younger generations of workers in recent survey years are more skilled and better educated than the older generations in early survey years. Thus, the changing compo-

[9] Relative wages are calculated by taking 540 groups defined by gender, education, and experience, and calculating mean wages by group for each year. Mean wages for each year are estimated using fixed weights based on the average population weights of each group over time. Relative wages are calculated as the ratio of average mean wages for the groups being compared. Perhaps, if migrants were included, the relative supply of skilled workers in urban areas would have declined. However, Park et al. (2004) show that even when migrants are included, the relative supply of skilled workers increased during the 1990s.

sition of the labor force over time could explain the rise in returns to schooling if schooling quality has improved over time or if the correlation between unobserved ability and education is greater for new workers. To check this possibility, we compare within-birth cohort changes in the returns to skill over time, which follows the same group of people, so that no composition effect is present, with changes over time in the returns to schooling for different experience groups, which reflects both composition changes and changes in the true returns to schooling.

From Table 6, the one-to-ten-year experience group in 1990 had a return to schooling of 6.8 percent and the eleven-to-twenty-year experience group in 2000, which is the same birth cohort 10 years later, had a return to schooling of 11.6 percent. This 4.8 percentage point increase compares with a 6.0 percentage point increase in the returns to schooling for the one-to-ten-year experience group from 1990 to 2000. Similarly, for the eleven-to-twenty-year experience group in 1990, the within-cohort returns to schooling increased by 4.2 percentage points over the next decade compared to a 5.8 percentage point increase in the returns to schooling for the eleven-to-twenty-year experience group. For these two cohorts, the large increases in the returns to schooling within birth cohorts suggest that the result is not due to a composition effect only. If we attribute all of the within-birth cohort changes in the returns to schooling over time, i.e., 4.8 and 4.2 percent for these two cohorts, to changes in the labor market and, if the changes in the returns to experience groups, i.e., 6.0 and 5.8 percent, reflect both these changes and composition effects, the composition effects account for only 20 and 28 percent of the total increase in the returns to schooling.

To investigate demand effects, we consider factors explaining the patterns in the returns to education over time, namely the reform of labor market institutions and other demand factors, such as skill-biased technical change and globalization. Unfortunately, direct tests of the importance of the latter two are beyond the scope of this paper. Evidence that reforms in labor market institutions have contributed to rising returns to education follows from the expectation that differential rates of return to education across previously segmented labor markets will converge in more integrated labor markets due to factor price equalization. Skilled workers have an incentive to move to labor markets with higher returns until differentials disappear. In Table 9, we calculate the coefficients of variation of the returns to schooling across groups defined by experience, ownership, and region from the results presented in Tables 6, 7, and 8. We find strong evidence of convergence in all three cases, but especially in the latter two. The coefficient of variation in education returns across ownership groups falls from a peak of 0.62 in 1992 and 1993 to only 0.16 by 2001 and the coefficient of variation across provinces falls from a peak of 0.37 in 1989 to less than 0.10 in 1999 and 2000, before rising to 0.14 in 2001. Convergence occurs despite the persistence of institutions inhibiting labor mobility, e.g., restrictions on residential mobility.

A second source of evidence for the institutional reform explanation comes from the timing of increases in the returns to schooling. The increases are not steady over time, but rather are highly concentrated in two periods, namely 1992 to 1994 and 1997 to 1999. These two periods correspond to two well-known episodes of economic liberalization. The period from 1992 to 1994 brought new confidence in the irreversibility of economic reforms; it featured high growth and rapid expansion of the non-state sector. The phrase *xiahai*, which means literally to jump in the ocean, was coined in that period to describe

Table 9
Coefficients of variation of the returns to schooling, by experience, ownership, and province, 1988 to 2001

Year	Experience	Ownership	Provinces
1988	0.26	0.46	0.33
1989	0.24	0.50	0.37
1990	0.28	0.42	0.31
1991	0.26	0.49	0.28
1992	0.29	0.62	0.21
1993	0.18	0.62	0.24
1994	0.30	0.42	0.19
1995	0.20	0.31	0.24
1996	0.28	0.42	0.13
1997	0.19	0.41	0.17
1998	0.18	0.29	0.13
1999	0.16	0.16	0.09
2000	0.21	0.26	0.07
2001	0.16	0.16	0.14

leaving the state sector for the private sector. The period from 1997 to 1999 featured economic restructuring and the resulting lay offs of millions of state-sector workers. Most of the laid off workers who were lucky enough to find new jobs went to the private sector, as Giles et al. (in press) attest. Because the impact of processes such as technological change and the effects of trade and FDI are gradual, the uneven pace of increasing returns to schooling suggests strongly that institutional reforms played a major role. Even if trade and FDI had immediate effects, the timing of globalization does not match the periods of increasing returns to schooling, as Fig. 2 shows. Returns to schooling, exports as a share of GDP, and FDI as a share of net fixed investment are plotted over time to demonstrate the point.[10] Increases in the returns to schooling are not procyclical because the period from 1997 to 1999 exhibited slow growth in China.

Finally, the finding that returns to education increased significantly for all groups of workers is robust, regardless of how groups are defined. Hence, increases were not caused by structural shifts of production from the state to non-state sectors or from some industries to others.[11] Rather, the evidence suggests that deeper labor market reforms increased the reward to skill within ownership and industry groups. Although skill-biased technical change is a possible explanation, the timing of the changes indicates otherwise. Rather the patterns of education returns by ownership type are consistent with a state-sector reforming itself in response to persistent competition from the non-state sector, rather than simply growing out of the plan and shifting labor from the planned state sector to the market-oriented non-state sector. Reviewing all of this evidence, we conclude that the rising returns to education in China are associated strongly with institutional reforms that increased the market-orientation of production and labor allocation on the demand side.

[10] Neoclassical trade theory predicts that trade will lead to specialization in goods intensive in the factor of relative abundance; for poor countries, this suggests that trade should reduce the returns to education.

[11] Even after controlling for industry differences, the returns to schooling increase by 4.5 to 4.8 percent over the period compared to a 6.1 to 6.2 percent without such controls, as Table 4 indicates.

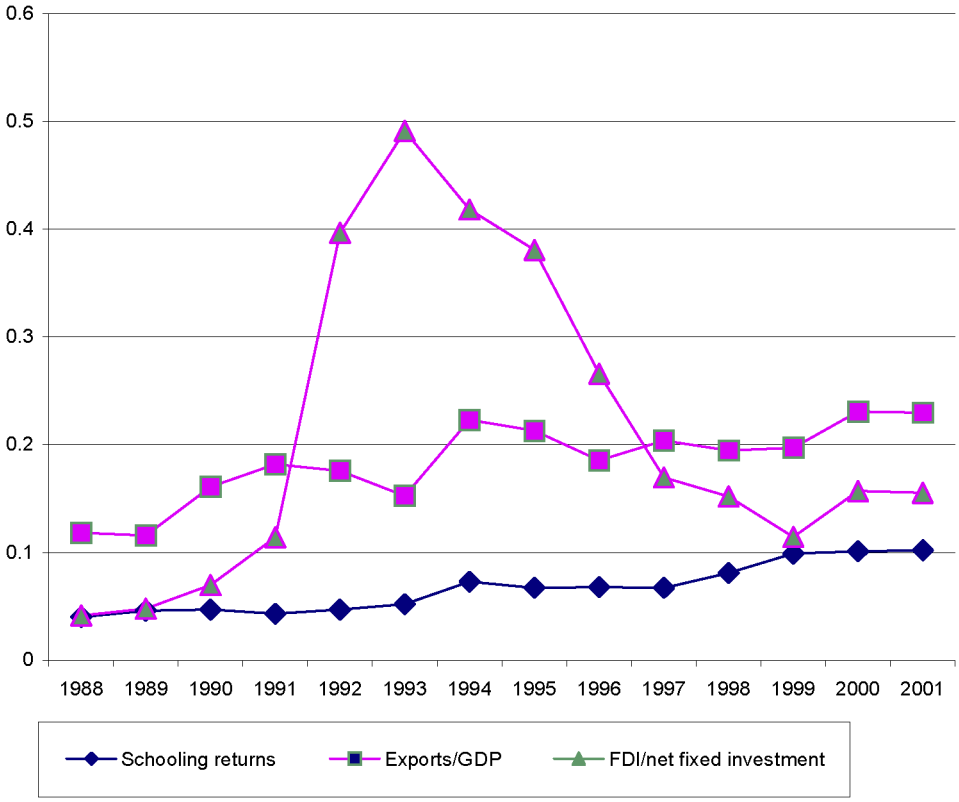

Fig. 2. Schooling returns, FDI, and trade, 1988 to 2001.

However, additional work is necessary to evaluate the contributions of skill-biased technical change and globalization to the rising returns to skill in China.

7. Conclusion

Like other transition economies, China had an extremely compressed wage structure in the pre-reform period but experienced dramatic increases in the returns to education and inequality. Such changes occurred in the early period of transition in central and eastern European economies, as Svenjar (1999) and Rutkowski (2001) report. However, in China, returns to education and the level of inequality remained low until the early 1990s, more than a full decade after economic reforms began (S. Li, 2003). This experience is consistent with China's gradualist approach to reform, a strategy that was at least partly born out of necessity. Until the early 1990s, the Chinese government maintained its political commitment to urban workers by delivering guaranteed jobs and benefits through state-owned enterprises. Unfortunately, this policy hindered labor mobility and the development of the labor market. However, around 1992, the financial costs of propping up state-owned

enterprises proved unsustainable, so that China moved ahead with aggressive enterprise restructuring accompanied by massive layoffs. Other important changes, e.g. social security reform, the rise in both non-state firms and labor mobility, and globalization, also supported the development of the labor market in the middle and late 1990s.

Our study provides estimates of schooling returns in urban China over this extended period of economic reforms. We show a dramatic and robust increase in the returns to education in urban China in the 1990s. In 1988, the rate of return to education was only 4.0%; by 2001, it had risen to 10.2%. Most of the rise in returns to education occurred in two periods, i.e., 1992 to 1994 and 1997 to 1999. The most prominent increase in the wage premium occurred for college-educated workers. However, the rise in schooling returns is observed across all groups of workers defined by gender, experience, region, and ownership, and is robust to adding other control variables.

This increase in the returns to schooling in urban China presents challenges for China's labor markets. Specific patterns suggest that institutional reforms played a key role in increasing the returns to schooling in China. Hence, the Chinese labor market has made significant progress during the 1990s in improving the efficiency of labor allocation and furthering labor market integration. An important consequence of the rising returns to education is that incentives for human capital investments have improved, which augurs well for the future quality of the labor force. Using our estimates for the returns to education and making assumptions about the costs of educational investments, we estimate that the private internal rate of return for a college degree is about 15 percent in China today.[12] However, rising returns to schooling contribute to higher levels of income inequality associated with differences in human capital. We show that changes in the relative supply of skilled workers and compositional changes in the labor force cannot explain the observed increase in the returns to schooling. Hence, we conclude that the demand for skilled labor has increased dramatically and institutional reforms have no doubt contributed importantly to this increase. Remaining important unanswered questions about the causes of the rising schooling return require more detailed research using appropriate data to disentangle the effects of other contributing factors, such as skill-biased technical change and globalization.

Acknowledgments

The authors are grateful to the Editor, two anonymous referees, Belton M. Fleisher, and participants in several conferences for valuable comments. They acknowledge financial support from the Chinese University of Hong Kong (Direct Grant), Research Grant Council of Hong Kong (N_CUHK417/01), National Natural Science Foundation of China (Beijing

[12] According to Table 3, an individual with a college education or above earns 37.3% more than a senior high school graduate. Because people with a master's degree or higher represent a small share of the work force with advanced degrees, we assume that the return to a college education for high school graduates is 35%. Assuming an annual growth rate of wages of 8.2%, which we calculate from our sample data, tuition of 5000 yuan per year (current tuition for undergraduates at Peking University), and a working life after college of 40 years, we calculate the internal rate of return for college education to be 15%.

Appendix Table A
Determinants of log wage, 1988 to 2001

	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Years of schooling	0.0402	0.0463	0.0468	0.0433	0.0472	0.0521	0.0732	0.0672	0.0680	0.0673	0.0813	0.0995	0.1008	0.102
	(0.0018)	(0.0022)	(0.0019)	(0.0020)	(0.0018)	(0.0022)	(0.0026)	(0.0027)	(0.0028)	(0.0030)	(0.0031)	(0.0031)	(0.0035)	(0.0038)
Potential experience	0.0471	0.0461	0.0480	0.0422	0.0377	0.0356	0.0301	0.0321	0.0336	0.0332	0.0292	0.0320	0.0241	0.0312
	(0.0018)	(0.0021)	(0.0019)	(0.0020)	(0.0017)	(0.0022)	(0.0024)	(0.0026)	(0.0026)	(0.0027)	(0.0028)	(0.0029)	(0.0031)	(0.0033)
Potential experience squared	−0.0007	−0.0006	−0.0007	−0.0006	−0.0005	−0.0005	−0.0004	−0.0004	−0.0005	−0.0005	−0.0003	−0.0004	−0.0003	−0.0004
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Male	0.1149	0.1138	0.1094	0.1222	0.1255	0.1396	0.1406	0.1281	0.1443	0.1522	0.1258	0.1208	0.1235	0.1607
	(0.0092)	(0.0116)	(0.0101)	(0.0105)	(0.0093)	(0.0113)	(0.0125)	(0.0126)	(0.0130)	(0.0137)	(0.0140)	(0.0138)	(0.0150)	(0.0164)
Beijing	0.1476	0.0889	0.1224	0.0217	0.0777	0.1841	0.2656	0.3310	0.4309	0.3569	0.3013	0.3098	0.2764	0.2768
	(0.0188)	(0.0282)	(0.0203)	(0.0245)	(0.0133)	(0.0162)	(0.0193)	(0.0189)	(0.0188)	(0.0199)	(0.0212)	(0.0217)	(0.0212)	(0.0258)
Liaoning	0.0521	0.0382	0.0623	−0.0418	−0.0132	−0.0230	−0.0005	0.0480	0.0565	0.0272	0.0038	−0.0265	0.0275	0.0068
	(0.0114)	(0.0153)	(0.0125)	(0.0120)	(0.0106)	(0.0144)	(0.0171)	(0.0161)	(0.0172)	(0.0176)	(0.0187)	(0.0194)	(0.0191)	(0.0239)
Zhejiang	0.1995	0.1611	0.1729	0.1303	0.2294	0.3275	0.4267	0.4883	0.5596	0.5103	0.4476	0.4293	0.4653	0.5314
	(0.0140)	(0.0161)	(0.0140)	(0.0142)	(0.0129)	(0.0167)	(0.0195)	(0.0187)	(0.0192)	(0.0197)	(0.0211)	(0.0221)	(0.0216)	(0.0269)
Guangdong	0.4781	0.4811	0.5621	0.6491	0.7681	0.8236	0.9488	0.9625	1.0374	0.9602	0.9964	1.0246	0.9073	0.9412
	(0.0146)	(0.0166)	(0.0162)	(0.0152)	(0.0158)	(0.0194)	(0.0206)	(0.0200)	(0.0205)	(0.0213)	(0.0216)	(0.0212)	(0.0222)	(0.0266)
Shaanxi	−0.0740	−0.0489	−0.0493	−0.0874	−0.1757	−0.1688	−0.2591	−0.1682	−0.1193	−0.1925	−0.2250	−0.2108	−0.2416	−0.1654
	(0.0144)	(0.0150)	(0.0141)	(0.0137)	(0.0144)	(0.0181)	(0.0214)	(0.0194)	(0.0202)	(0.0214)	(0.0229)	(0.0230)	(0.0245)	(0.0291)
N	6087	5615	6194	6225	7853	7017	6752	6830	6651	6641	6331	6094	6197	5404
R-squared	0.4397	0.37	0.4373	0.4861	0.5222	0.4846	0.5178	0.5169	0.5227	0.4864	0.4997	0.5389	0.4591	0.4604

Note. Standard errors are in parentheses.

University and Zhejiang University), and Visiting Research Fellowship awarded to Yaohui Zhao by the World Bank. Ching-yi Kung provided excellent research assistance.

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