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*Returns to Schooling in China
Under Planning and Reform*

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Abstract

We estimate returns to schooling using a retrospective work history survey covering more than 4,000 workers over the period 1950 to 1994, with particular emphasis to the returns to schooling for workers who attended institutes of higher education and who graduated from college. We find evidence that schooling returns declined throughout the period leading up to the Cultural Revolution (CR), with returns for workers who did not attend college becoming negligible. Returns to those with some college education remained positive, but low compared to other countries. Consistent with other studies, we find that returns to schooling did not recover from their CR low until the 1990s. Increases in the return to schooling during the transition following the CR were not associated directly with workers changing jobs or with taking “new-economy” jobs but appear to have occurred for most workers across all ownership categories. Workers most likely to leave jobs in the traditional ownership sector for jobs in the private or joint-venture categories were those who entered the labor force prior to 1967. We do not find evidence supporting other studies’ finding that schooling returns for college graduates increased more than for workers with lower levels of schooling attainment.

JEL Codes J31, J24, O15

Keywords: returns to schooling, skills, China

1. Introduction and Background

From about the inception of economic reform in China into the early 1990s, wage differences by level of skill, occupation, and/or schooling remained very narrow, implying that returns to higher education were quite low in comparison with those in other industrialized and industrializing countries including those in some smaller transition economies, such as the Czech Republic, Slovenia, and Bulgaria ². It is tempting to conclude that China's low personal returns to schooling were determined simply by relatively slow erosion of the wage grid that prevailed under central planning (Knight and Song, 1991; Liu, 1998; Meng, 2000), but this simple explanation faces at least two difficulties: First, the low relative pay of workers with higher levels of education appear to have persisted longer into the reform period than might be expected based on the record in eastern European transition economies described above. Second, wage compression has been observed in enterprises of all ownership types in China. (See, for example, Fleisher and Wang, 2001.)

Recent research suggests that reform and marketization are finally contributing to an increase in the relative wages of educated workers, although the evidence is not universal. Li (2003) and Zhang and Zhao (2002) report the results of research that involve major departures from earlier studies: Li uses data from the urban sample of the 1995 China Household Income Project (CHIP-95) conducted in 1996 and based on a sample of 6,928 households and 21,688 individuals. Zhang and Zhao use data on employees age 16-60 from twelve Urban Household Surveys, 1988 through 1999. An advantage of the CHIP-95 data is that they include information on work hours, which are negatively correlated with hourly pay, leading to negative bias in estimated returns when weekly or monthly income is the dependent variable. Also, the CHIP-95 data contain more accurate information on actual work experience than previous surveys. A feature differentiating Li's work from earlier research on private returns to schooling in China is estimation according to year of first job, before 1980, 1980-87, and 1988-1995. Individuals whose first job occurred prior to 1980 clearly have schooling of an older "vintage" and are more likely to have been affected by educational biases of the Cultural Revolution. Li asserts (reasonably) that year of first job is likely to reflect the

“grandfathering” of wage differentials inherent in the old wage grid. In a society where interfirm mobility has been severely limited by well-known economic and political constraints, it has surely been relatively more difficult for older workers to take advantage of opportunities offered by economic reform. Li’s econometric results indicate that overall returns to schooling in China remain low, on average, and that the increase in the return to schooling has been most notable for college graduates. Zhang and Zhao report that by 1999, returns to schooling estimated with an ordinary Mincer equation had risen to 11.5%, quite respectable by international standards. They also report an extra earnings premium for college graduates.

The main goal of this paper is to identify conditions that affected the relatively slow increase of returns to schooling in China during the reform period. Given Li’s (2003) and Zhang and Zhao’s (2002) observations mentioned above as well as the importance of college-educated workers in terms of their contribution to production in China (Fleisher and Wang, 2003; Fleisher, Dong, and Liu, 1996; Fleisher and Chen, 1997), we pay particular attention to the relative earnings of college graduates below. In the next section we summarize the course of returns to schooling during the Cultural Revolution. Section 3 presents a more formal regression analysis of the return to schooling in China from 1950 to 1994 and examines evidence on whether returns to schooling have been related to job mobility during the reform period. Section 4 concludes.

2. The Decline in Ror and the CR

It is our view that a valuable perspective is gained from an understanding of the course of earnings differentials prior to the end of the Cultural Revolution (CR) and beginning of reform. Private returns to schooling (reflected in measures of wages or income) were by no means constant under the period of socialist planning in China. This can be seen in data derived from a representative sample of approximately 4,000 urban residents collected in late 1994 which contains retrospective data on residence, work, schooling, incomes, and related variables for the period 1950-94. (See Zhou and Moen, 2002 and Zhou, 2000 and related papers).³ As illustrated by both the bars and the trend line in chart 1, the difference between the log-income of college graduates and the log-income of individuals with at most elementary schooling fell from about 0.6 (a ratio of about 1.8) in the years prior to 1960 to about 0.28 (a ratio of about 1.3) in the years surrounding 1980, marked the approximate beginning of economic reform. The trough in the trend occurs at or somewhat before the earliest date included in most studies of the return to schooling in China. The log-income differences plotted in chart 1 have the same dimension as returns to schooling and may be interpreted as such in a crude sense. Assuming a 10-12-year schooling gap between elementary-school and college graduates, the implied marginal rate of return per year of schooling for college graduates was approximately 5 - 6% shortly after the beginning of the Communist era, falling to about half that in the very early years of reform. After reform, the earnings premium for college education eventually accelerated sharply beginning around 1990, with the trendline implying a ratio of the income of college graduates to those with no more than elementary schooling equal to approximately 2.0 in 1994, almost the same as reported by Zhang and Zhao (2002). This implies a marginal rate of return per year of additional schooling equal to about 6 -7 %, somewhat greater than the 5.4% reported by Li (2003), using CHIP-95 data.

The income gap reported in Chart 1 did not fall abruptly at the beginning of the CR, but rather declined from about the beginning of the 1960s, consistent with various

policies of the Chinese leadership toward equalizing incomes (Zhou, 2000). The slight increase in the earnings gap that appears in our sample of earnings between 1971 and 1980 is quite small relative to the two peaks in the series, and the fitted trend line appears to bottom out around 1980. There is absolutely no evidence in these data, or in the work of others cited above, that returns to schooling began to increase until at least a decade after the end of the CR. What conditions contributed to the decline in the wage gap? Three factors appear to have been involved. One is a narrowing of wage differentials between traditionally “good” and “bad” jobs. A second factor is narrowing of pay gaps between workers who differ in schooling within these jobs. The third possibility is that college graduates were less likely to be assigned to jobs in favored occupations, industries, and geographical locations. In the extreme, college graduates might be “sent down” to jobs in agriculture or rural enterprises. Regarding the first factor, Zhou (2000) finds that pay differentials between higher- and lower-paid occupations declined significantly but irregularly between 1960 through the 1980s. With respect to the second factor, Zhou (2000) reports that pay differentials also declined between high-paying employers (e.g. firms owned by the central government) and others. In estimates of the return to schooling based on multiple regressions in which the log of income is regressed not only on schooling, but also on occupation, workplace type (government agency, public organization, state-owned enterprise (SOE), other government-owned enterprises, and private/hybrid enterprises), and a dummy variable for each city represented in the data, the coefficient of a dummy variable for workers who completed college was a statistically significant 0.18 in 1960 (implying a marginal rate of return to an additional year of schooling equal to approximately 1.8%) and declined steadily to an insignificant 0.03 in 1984. It returned to approximately its 1960 level by 1987. (Zhou, 2000, p. 1156) Evidently, pay differentials fell both between good and bad jobs and between workers holding them.

As for the third factor, the assignment of college graduates to good versus bad jobs, the evidence is consistent with discrimination against the well-educated, at least those who had completed high school. Zhou and Hou (1999) report that conditional on family background, the relatively most likely group of young people to be sent-down to

rural jobs was high school graduates. The probability of college graduates being sent-down was not significantly higher than that of junior-high school graduates in the first four years of the CR, but somewhat higher than that of the benchmark group in the period 1972-1978. Meng and Gregory (2002, p. 936) report that colleges essentially ceased operations from 1966 through 1971, and students who had entered college before 1966 were granted degrees and assigned jobs in 1971, usually as school teachers, factory workers, or members of the army. Subsequently, universities recruited students based on their political attitudes and/or social background, not on academic merit, and no senior high school students could go to college directly.

The data graphed in chart 2 approach the question of job assignment by showing the proportion of college graduates either starting or changing jobs whose first or new job is classified as “good,” where we define good jobs to be those where the work unit is a government agency, public organization, or state-owned enterprise located in a provincial capital, a large, or a medium city; bad jobs are all others, namely, collectively- or privately-owned enterprises, farms, or others not classified elsewhere located in small cities, towns, or rural areas. (Private enterprises would be unusual in era of state planning and the CR period, of course.) There is a dramatic decline in the proportion of college graduates who obtained good jobs during the first five years of the CR period. For those leaving college and beginning their first job, the proportion who enter good jobs declines from about 90% or more prior to the CR to less than 40% during the first five years of the CR and then disappears. It does not become positive again until the period 1981-85. Among those whose first job occurred before the CR, the proportion of those changing jobs who entered a good job also drops sharply during the first part of the CR, but it returns to about 70% during the period 1971-75 and increases to about 80% through 1986-90 after which it declines to less than 60%. Among new college graduates, the proportion obtaining good jobs also reaches approximately 80% during the 1980’s and then declines sharply in the 1991-95 period. Of course, to job seekers in the reform era, a “good” job as defined by the standards that existed before 1980 would not necessarily mean the same thing as it used to. Therefore, the relatively low proportion of college graduates entering “good” jobs in the 1990’s cannot necessarily be

viewed as evidence of depressed demand for their services in the context of economic reform. Rather, it reflects the lag from the beginning of reform, which started with the spread of the responsibility system in farming, then to rural enterprises, and only later into the urban economy after the “kick start” given by Deng’s “trip to the south” in 1992. It perhaps also reflects strong element of conservatism among educated job seekers, who have been loath to forego the job security of the state sector in return for uncertain gains in collective, private, and jointly owned firms. Zhang and Zhao (2002) note that the proportion of urban workers in the state-owned sector remained at close to 80% through at least 1995 and declined only slowly after that.

3. Regression analysis of returns to schooling

A deeper understanding of changes in the return to schooling in China requires more detailed statistical analysis.. For the first year an individual works, the Mincer equation is

$$y_0 = a + mS_0 \quad (1),$$

Which we modify to accommodate the availability of observations by year in our data as follows:

$$y_t = \underset{t=1970}{\overset{1990}{\mathring{a}}} a_t const_t + \underset{t=1970}{\overset{1990}{\mathring{a}}} const_t m_t S_o \quad (1a)$$

in the first year that an individual works in the labor force (and experience is by definition zero) where the subscript τ stands for the year in which the individual first enters the labor force (defined as the cohort year), and we use the following cohorts: before 1970, 1975, 1978, 1984, 1987, and 1990. The choice of these cohorts is pragmatically based on our desire to maximize the number of usable observations while retraining some tractability in the number of dummy variables. The variable $const_t$ is a dummy variable for each cohort year. Thus, we allow for a separate intercept in each cohort year and a different return to schooling for each cohort year. We assume that no

further schooling is obtained so that we can drop the subscript for the schooling variable. In general, we have for subsequent years,

$$\begin{aligned}
 y_{tT} = & \underset{t=1970}{\overset{1990}{\hat{a}}} \underset{T=1975}{\overset{1990}{\hat{a}}} a_{Tt} \text{const}_{Tt} + \underset{t=1970}{\overset{1990}{\hat{a}}} \underset{T=1975}{\overset{1990}{\hat{a}}} m_{Tt} \text{const}_{Tt} S + \\
 & \underset{t=1970}{\overset{1990}{\hat{a}}} \underset{T=1975}{\overset{1990}{\hat{a}}} c_{Tt} \text{const}_{Tt} (T - t) + \underset{t=1970}{\overset{1990}{\hat{a}}} \underset{T=1975}{\overset{1990}{\hat{a}}} d_{Tt} \text{const}_{Tt} (T - t)^2
 \end{aligned} \tag{2}$$

where y is log income, T is the observation year, and τ is the initial or cohort year so that $(T - t)$ is a proxy for total experience in the observation year, and experience is 0 in the year of first job .

Table 1 reports estimated returns to schooling derived from a regression based on equation (2), which also includes a dummy variable for gender, a continuous variable for number of years in which a respondent was “sent down” during the Cultural Revolution, and a continuous variable for any years of college education acquired during the years 1969-1972, when universities were operating but were required to teach only approved subjects. The numbers along the diagonal of Table 1 is the estimated return to schooling for first job, and those in the other cells correspond to each cohort’s return to schooling in the years indicated by the column titles.

The estimated marginal return to a year of schooling is also illustrated graphically in chart 3. The movement to equalize incomes prior to the beginning of the CR is clearly reflected in the estimates reported in table 1. The null hypothesis of a zero return to schooling on the first job cannot be rejected for 1975 and 1978, and it rises gradually to about 4.5% by 1990, which is still low by international standards, as discussed above. Assuming that relative wages for given jobs were determined by a formal “grid,” the decline in returns for first job would appear to be due to unfavorable job assignments, reflecting the pattern noted in the discussion of chart 2. Additional evidence supporting

this conjecture is that the return to schooling for the oldest cohort—those whose first jobs occurred prior to 1970, never falls below 2%. By 1990, these older and more experienced workers received a return to schooling of approximately 6%, while those who entered the labor force in 1975 approached 8%. On the other hand, the younger cohorts whose first jobs were in 1984, 1987, and 1990, appear to have received smaller returns to schooling than did the older cohorts. The bottom row of table 1 is a weighted average (weights based on sample frequencies of the cohorts) of the estimated returns reported in the respective columns. They show that the average marginal return to schooling increased from a low of 1.4% in 1978 to approximately 6% in 1990. The 1990 estimate is about one-fourth larger than Li's (2003) and about one-tenth larger than that reported by Zhang and Zhao (2002) for 1990. The relatively low estimated returns for those whose first job occurred in the period following the end of the CR is a curiosity that warrants further investigation. This is in conflict with results reported by Li (2003) and by Zhang and Zhao (2002).

Recent work by Giles, Park, and Zhang (2003) and by Heckman and Li (2003) provides evidence that OLS estimation of returns to schooling in China are biased estimators of the return that would be obtained if a random individual were “treated” with an additional year of schooling. Giles, Park, and Zhang use an original data source for the year 2000 that provides detailed information on parental educational background, psychological instruments, and data on the inter-city difference in the proportion of high-school (“educated”) youth who were sent to the countryside for reeducation during the Cultural Revolution. They use this information in a “natural experiment” framework to isolate exogenous shifts in the amount of schooling obtained. Their IV estimates of return to schooling, which include variables for education of both parents, quality of elementary, middle, and secondary school attended, and father's occupational level, imply that OLS estimated returns to schooling are upward biased estimators of a random treatment effect by about 65% for those with less than a college education and downward by about 50% for those with college education. Their IV estimates of returns to all levels of schooling are about 43% higher than their OLS estimates. Based on an urban sample for the year 2000, Heckman and Li find that when individual heterogeneity

and sorting according to comparative advantage is considered, the estimated return to completing four years of college is 0.56 (an annual return of 11.7%) compared to an OLS estimate of 0.29 (an annual return of only 6.6%).

We have estimated the Mincer equation specified in equation (2) using an IV approach in which schooling is endogenous and the instruments are birth year, dummy variables for location of elementary school (rural or small town, medium city, or large city), a dummy variable for whether any normal high-school years occurred during the Cultural Revolution, and interaction terms between the location and CR-year variables. The adjusted R^2 of the IV equation is 0.17. The IV estimated returns to schooling are reported in table 1a. Comparing the weighted average for all cohorts, the IV estimated return to schooling in 1975 is statistically indistinguishable from zero, as is the mean of the OLS estimates. In 1978, the IV estimate is about 40% higher than the OLS estimate, but still quite low in absolute value. However, in 1984, 1987, and 1990, the IV estimates are approximately 3 times as large as the OLS estimates, exceeding 10% in every year. These estimates are far higher than reported in any study of which we are aware. (As discussed in the next subsection, we were unable to obtain meaningful or significant estimates of an *additional* return to completing college in the reform period (compared to secondary school) using either OLS or IV estimation techniques.) In a cross-section study of returns to schooling estimates of 9 transition economies, including China, Russia, and major Central and Eastern European Countries, Fleisher, Sabirianova Peter, and Wang find that controlling for a large number of variables including date, degree of privatization, and macroeconomic conditions, IV estimates on average yield estimates of rates of return that are between 4 and 5 percentage points higher than OLS estimates.

What do these IV estimates tell us about rates of return and economic policy? There is considerable evidence that private returns to schooling (based on income or wage data) were much smaller than social returns to schooling in China during the 1980s and early 1990s. Fleisher, Dong, and Liu (1996), Fleisher and Wang (2001), and Fleisher and Wang (2004), all report evidence that within enterprises skilled and highly educated workers were paid far less than their marginal products, while workers with

lower skill levels and less schooling were paid more than they would have earned under profit-maximizing conditions. The tendency of IV and heterogeneity-corrected estimates to yield higher estimates of “treatment” effects suggests that despite the systematic underpayment of high-skilled workers within enterprises, those who somehow broke out of the usual constraints to acquire additional schooling found jobs that paid more than those who followed the more typical schooling patterns.

i. Returns to college education

We are interested in learning whether completing a four-year university degree yields a higher marginal return than completing lower levels of schooling. We noted in the discussion of chart 1 that college graduate appeared to earn about 28% more than those with only a primary education at the end of the CR. We modified the regressions reported in table 1 to allow a discontinuous effect of completing at least four years of college on earnings, holding constant experience, gender, and CR effects. The estimation results, not reported in detail here, imply a marginal return to a year of college equal to about 4.5%. Thus there appears to have been a definite additional benefit in terms of income for college graduates, even at the point, at the end of the CR, when the payoff to schooling in general had almost vanished in China. However, by 1990, the additional benefit of a college degree for the cohort who were college graduates in 1975 had vanished. We were unable to obtain meaningful IV estimates of the return to college education from our data. We believe this is due to the relative small proportion of college graduates in our sample.

ii. The impact of the CR

One of our goals is to examine the influence of the CR on returns to schooling. Four variables are included in the regression supporting table 1 that capture the impact of the CR on earnings. Two variables, measuring the number of years a person was sent down and the product of the sent-down dummy and schooling, are both statistically insignificant, implying that neither the level of earnings or relative earnings by schooling years have any relationship to the number of years sent-down. (Zhou and

Hou, 1999, explain the lack of a negative impact on returnees' earnings as being due in part to the advantageous political connections of those who returned earliest. They note that in the 1980s, sent-down youth were compensated in terms of experience-related wages by official regulation.) When a separate variable representing completion of four years of college is included as a dummy variable and interacted with sent-down years, the estimation results again imply no impact on the return to schooling. Another variable measures the number of years of schooling obtained in the years 1969-72, when the academic education for those who remained in school was particularly severely affected. Meng and Gregory (2002) point out that when schools in urban China were reopened gradually starting in the 1968-69 academic year, allowing some students to begin primary school or to complete their schooling, the type of education offered was geared toward promoting CR goals rather than traditional academic skills until 1972, when a return to the traditional curriculum began. As a result of these breaks, individuals who completed their schooling during the period 1969-72 are likely to have received low-quality education. The estimated coefficient of this variable is 0.23% and is statistically significant, implying that on average, workers who acquired some of the schooling during this period have not experienced lower returns to schooling than other workers.

iii. Job Changes and the return to schooling

One channel through which economic and labor-market reform is expected to affect returns to schooling is through enhanced opportunities for workers to take better-paying jobs. In order to test this hypothesis, the regression supporting table 1 includes a dummy variable reflecting whether a worker had changed jobs between years in which earnings were reported and the product of job-change with continuous schooling. The estimated coefficient of the dummy variable implies that individuals who changed jobs increased their relative earnings by about 5%; in contrast, the coefficient of the product term implies that changing jobs was associated with a somewhat lower return to education (about .36 percentage points). Both estimated coefficients are statistically significant.

Table 2 and chart 4 shed some light on the lack of correlation between higher returns to schooling and job mobility for college graduates. They show data on job changes by college graduates during the reform years following the CR. The columns of table 3 refer to type of work unit: government, public agencies, government-owned enterprises, collectives, private enterprises, farms, and others, which would include various types of jointly owned enterprises. We categorize work-unit types in columns (4) through (7) as “new-economy.” While this categorization has obvious defects, not the least of which collective enterprises in one form or another have existed throughout much of the period of central planning, it is surely arguable that government, public organizations, and state-owned enterprises at various levels of government are traditional “old-economy” jobs in China. So, our definition of “new-economy” work units should be construed as containing all those enterprises that are not included in the obvious “old economy.”

New jobs are categorized according to whether they are the respondent’s first job or not, and if not, by time period of the respondent’s first job. Approximately 55% of the college graduates in the sample started their first job in the period 1980-94, and almost 60% of the college graduates in the sample changed jobs during this period. In absolute terms, then, these workers cannot be called immobile. What is striking, though, is the overwhelming proportion of first- and new jobs that are clearly in the traditional economy. Of college graduates obtaining their first jobs in the period 1991-94, 100% are in work units classified as old-economy. Only in the period 1986-90 were there any first jobs in other but the first three enterprise category, and the proportion in the new-economy category is only 4.3%. Table 2 and chart 4 illustrate that the new jobs in the “new-economy” group is clearly largest in the latest time period, as one would expect. But again what surprises us is that, while slightly more than 10% of the new jobs are in the “new” group, all of these jobs were taken by job-changers, none by first-job takers. The overwhelming majority of those who took these jobs entered the workforce in after 1977. Our observations are consistent with those reported by Zhang and Zhou (2002) cited above.

As indicated above with reference to the regression results in table 1, we have found no evidence that college graduates enjoyed increased returns to their schooling over and above that experienced by workers on average or that changing jobs was associated with increased relative earnings of college graduates through 1994. They appear to have participated in the general increase in the rewards to education that have occurred throughout all sectors of the urban economy.

4. Conclusion

In this paper we have taken advantage of the quasi-panel nature of retrospective data collected in 1994 that contains work histories on more than 4,000 individuals from before the Communist era through 1994. These data clearly document the decline in returns to schooling under the equalization policies carried out under Mao Zedong, but they also show that college graduates were treated as essential to management of both government and industry. Even though the marginal return to an additional year of schooling appears to have become negligible, on average, from the middle of the CR through the early 1980s, the wage gap for college graduates declined significantly, but it did not completely disappear. The work-history data indicate that even during the Cultural Revolution, college graduates as a group appear to have avoided mass deportation to perform menial tasks in the countryside.

Data from three independent surveys of urban residents, including the one used in this study, confirm that returns to schooling in China did not begin to increase from the low levels observed at the end of the Cultural Revolution until almost 15 years after the initiation of market reforms. The impact of planning and the CR on the monetary return to schooling appears to have lingered well into the reform era, and returns to schooling appear to have approached levels comparable to those in other parts of the developing and developed world no earlier than the second half of the 1990s. Compared to other transition economies, China appears to have moved relatively slowly in terms of the development of private enterprise and joint ventures between private and SOE's at various levels. As Zhang and Zhao (2002) note, the great majority of urban employment remained in the public sector throughout the reform period and began to

decline more rapidly in the second half of the 1990s. We conjecture that wage differentials expanded relatively slowly in China in part because the private sector has developed slowly and workers were not rapidly bid away from public firms, forcing employers to meet the competition or lose their most valued employees. Li (2003) does show that returns to schooling in the (still very small) private sector were greater in 1995 data than in the government and public sectors, and this surely has exerted some competitive pressure on SOEs and collectives. This view is also shared in Zhou (2000). The data on job changes demonstrates that there was no mass migration of college graduates from traditional enterprises to those that are supposed to be favored by economic reform. Moreover, workers with less than college education appear to have benefited from changing jobs, but college graduates did not.

Slow adaptation of college graduates to work outside the traditional sector was due in part to slow growth of the private sector because of controlling official practices and regulation. In the first half of the 1990s, the share of non-state employment in total employment averaged between 30 and 35% (Fleisher, Sabirianova Peter, and Wang, 2004). However, this is still larger than our estimate of the proportion of college graduates taking jobs in this ownership sector. It appears likely that labor-supply decisions were important in determining the relatively slow movement of college graduates into the modern sector, although the relative weight of supply and demand factors is as yet unanswered question. Perhaps college-educated workers have not rushed to take jobs outside the traditional sector, preferring the relative income security and perquisites, e.g., housing benefits of traditional employment to the employment and income risks inherent in the new economy. (Fleisher and Yang, 2003) Such conservatism could play an important role in slowing down development of the private sector in China. Cross-country comparisons of the change in returns to schooling in transition economies should shed further light on this fascinating question of demand versus supply-side factors.

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Table 1 OLS Estimates of Rates of Return to Schooling Based on Equation (2) (%)

Year of First Job (Cohort)	Year of Income					Cohort Weight
	1975	1978	1984	1987	1990	
Before 1970	2.074*** (26.50)	2.053*** (26.81)	3.153*** (64.90)	4.413*** (124.57)	6.026*** (349.59)	0.4724
1975	-0.558 (0.52)	2.475*** (13.70)	4.795*** (32.40)	6.133*** (45.69)	7.913*** (71.32)	0.1734
1978		-0.642 (0.23)	2.246** (6.50)	3.674*** (17.78)	4.220*** (23.60)	0.0784
1984			1.928** (5.37)	3.384*** (21.52)	4.878*** (59.61)	0.1616
1987				3.707*** (7.01)	6.430*** (41.17)	0.0577
1990					4.535*** (19.69)	0.0565
Weighted Average*	1.367	1.862	3.171	4.448	5.965	

Number of usable observations is 13,572 based on 3075 individuals.

All test statistics are against the null $H_0 = 0$; $F(1,13525)$. (*) = 10% significance; (**) = 5%; (***) = 1%.

Table 1a IV Estimates of Rates of Return to Schooling (%)

Year of First Job (Cohort)	Year of Income					Cohort Weight
	1975	1978	1984	1987	1990	
Before 1970	-0.397 (0.06)	1.851 (149)	10.016 (48.84)	12.98 (83.02)	16.87 (196.08)	0.4724
1975	1.063 (0.30)	2.012 (1.74)	9.758 (36.28)	12.354 (53.58)	15.76 (91.66)	0.1734
1978		8.811 98.32)	18.481 (60.46)	21.188 (81.45)	23.105 (102.01)	0.0784
1984			10.243 (30.19)	12.327 (49.31)	14.464 (87.12)	0.1616
1987				7.829 (7.15)	10.661 (16.30)	0.0577
1990					5.846 (2.98)	0.0565
Weighted Average*	-0.00467	2.636	10.744	13.110	15.778	

Number of usable observations is 13,572 based on 3075 individuals.

F-statistics in parentheses

Endogenous variable is schooling. The instruments are birth year, dummy variables for location of elementary school (rural or small town, medium city, or large city), a dummy variable for whether any normal high-school years occurred during the Cultural Revolution, and interaction terms between the location and CR-year variables. The adjusted R^2 of the IV equation is 0.17.

Table 2
College Graduates' New Jobs

Type of Work Unit								
	Govt (1)	Public (2)	SOE (3)	Coll (4)	Priv (5)	Farm (6)	Other (7)	Total (4)-(7)
Absolute frequencies 1980-85 (55)								Relative Freq
This is First Job	2	7	8	0	0	0	0	0
Not First Job (1 st Job After 1977)	5	3	0	0	0	0	0	0
NFJ (1 st job 1967- 77)	5	9	3	0	1	0	0	0.018
NFJ (1 st job before 1967)	2	2	7	0	0	1	0	0.018
1986-90 (70)								
This is First Job	15	14	10	2	0	0	1	0.043
Not First Job (1 st Job After 1977)	2	1	0	0	0	0	0	0
NFJ (1 st job 1967- 77)	6	3	4	0	0	1	0	0.014
NFJ (1 st job before 1967)	2	2	7	0	0	1	0	0.014
1991-94 (52)								
This is First Job	5	13	9	0	0	0	0	0
Not First Job (1 st Job After 1977)	3	3	6	0	2	0	3	0.096
NFJ (1 st job 1967- 77)	1	0	2	0	0	0	1	0.019
NFJ (1 st job before 1967)	1	1	0	0	1	0	1	0.038

Note: Jobs in columns 4-7 are defined as "new-economy" jobs.

Chart 1
log income gap college minus low education

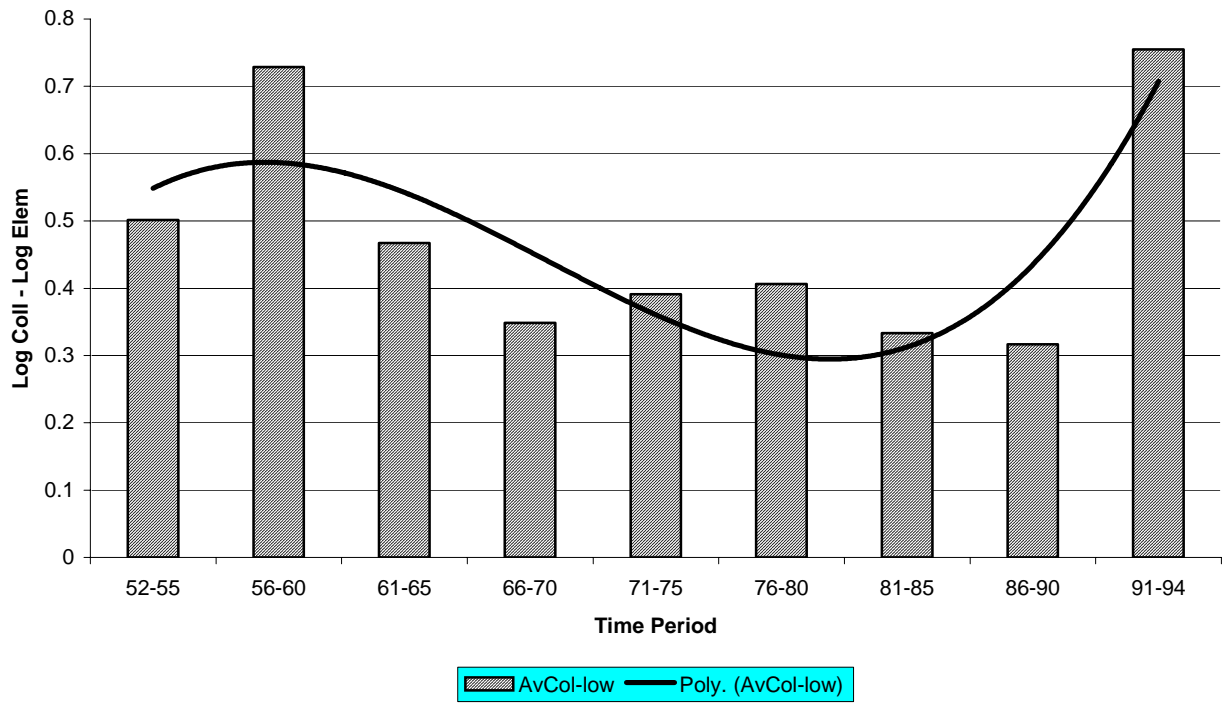
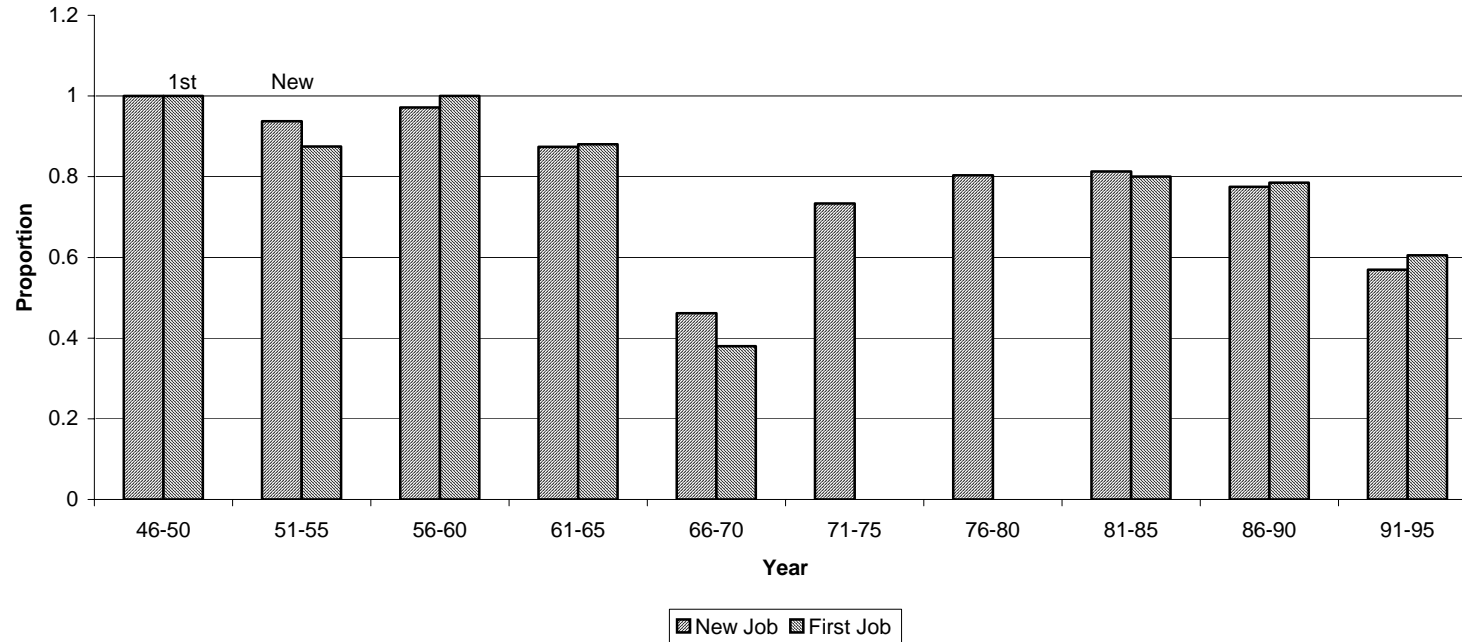


Chart 2
"Good" New and First Jobs



Note: "Good" jobs are those with work units that are government agencies, public organizations, or state-owned enterprises located in a provincial capital, large, or medium city. "Bad" jobs are all others.

Chart 3
Rate of Return on First Job (%)

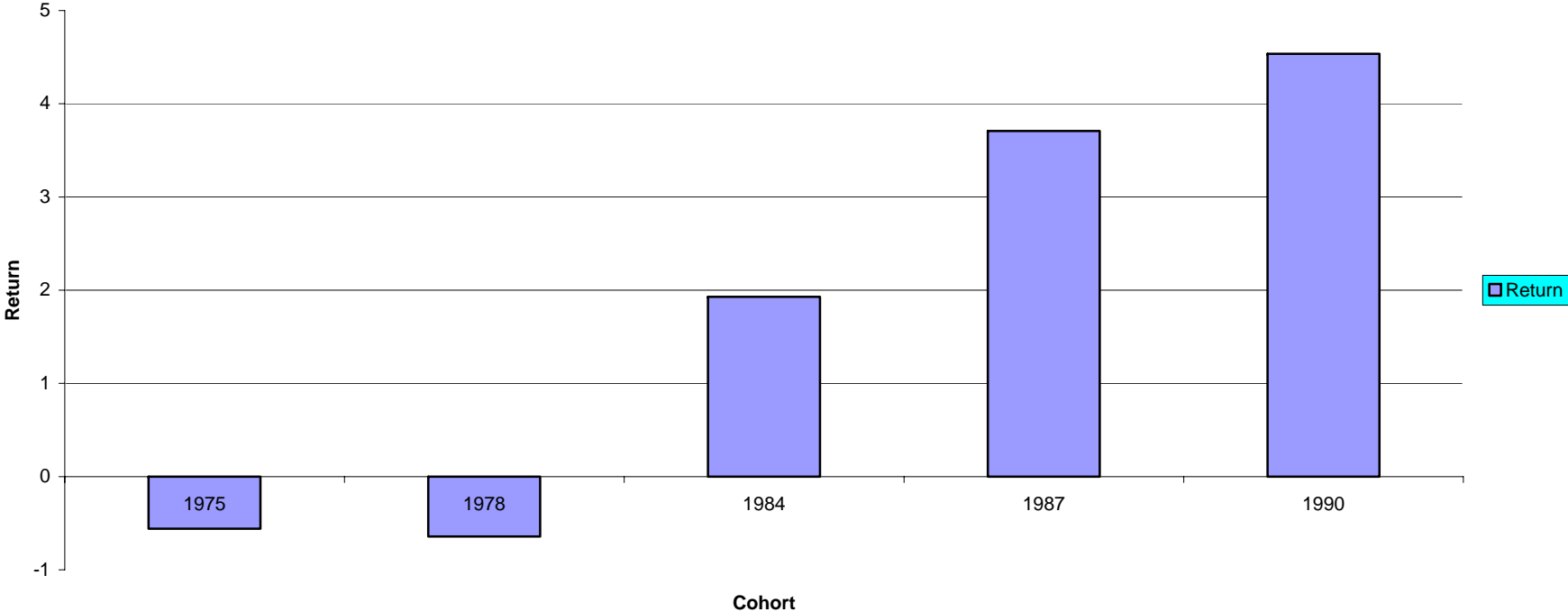
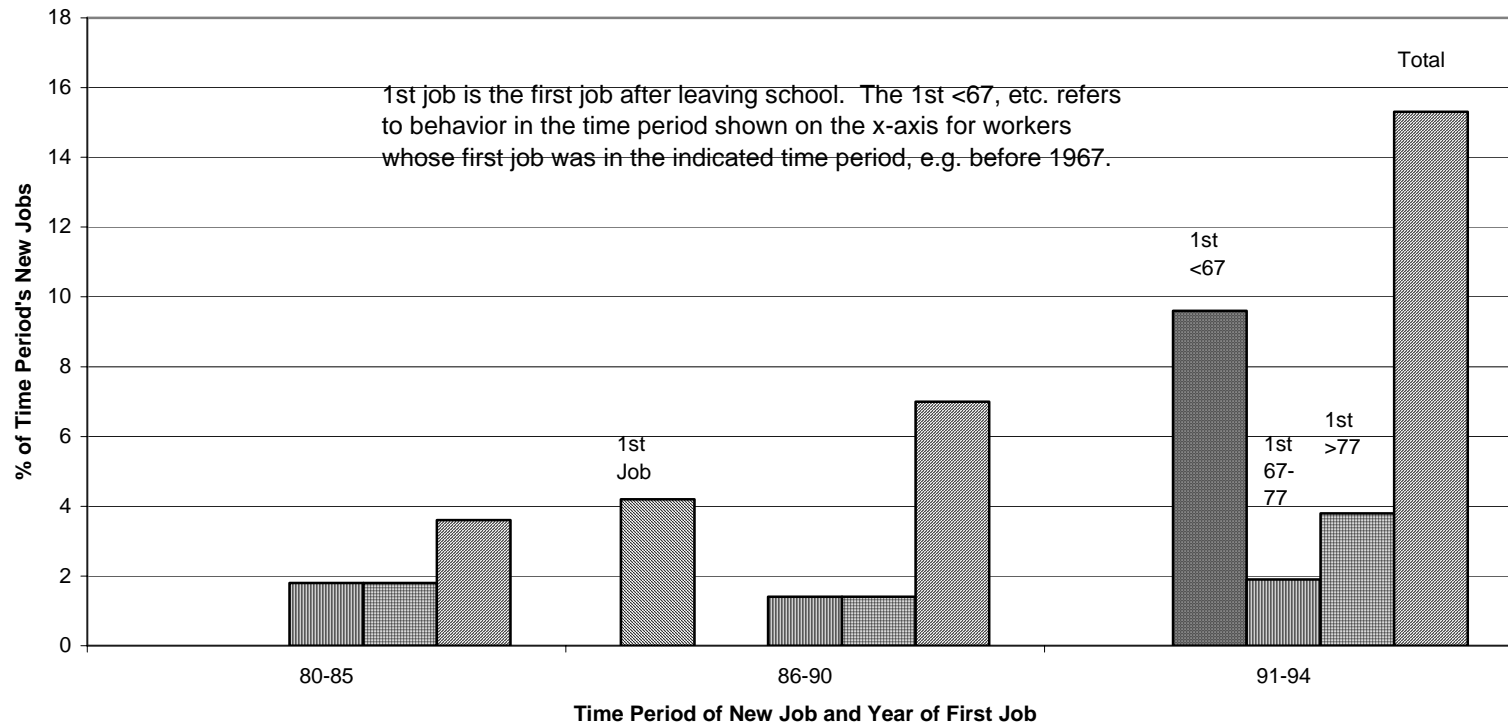


Chart 4
New Economy Jobs
College Graduates



¹ We are grateful to Jean-Louis Arcand for his helpful suggestions.

² For China See Zhang and Zhao (2002), Li (2003), and references cited in Fleisher and Wang (2001). For other countries, see Munich, Svejnar, and Terrell (2000), Orazem and Vodopivec, 1995, and Jones and Ilayperuma, 1994.

³ Meng and Kidd (1997) include the trough depicted in chart 1, as they analyze individual data for workers in the state sector in 1981 and 1987, and the low point in chart 1 implies an income gap between college graduates and those with minimal schooling that approximately matches their estimate (p. 412)

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