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Labor Market Emergence and Returns to Education in Rural China*

**Qiang Li, Alan de Brauw, Scott Rozelle,
and Linxiu Zhang**

Labor markets are the conduits through which labor moves from rural to urban areas, a shift in population that will drive China's development. Although the focus of considerable research, scholars do not agree on how well labor markets have been functioning during the past two decades (Cai, Wang, and Du). Some researchers believe that significant barriers still exist in China's economy, and that the absence of well-functioning rural labor markets has hindered growth (e.g., Benjamin and Brandt). Others (e.g., Meng) show that labor markets do not reward human capital, instead non-market factors are used in assigning jobs and wages. Indeed, de Brauw summarizes the literature on China's rural labor markets, showing that almost all estimated rates of return are abnormally low. In contrast, others believe that healthy rural labor markets have emerged and are continuing to evolve positively (e.g., Cook; Knight and Song). Most relevant to this paper (although the work is on urban labor

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markets), Maurer-Fazio argues that markets are improving because education is becoming an increasingly important determinant of off-farm earnings.

In this paper, our primary goal is to understand how well labor markets are functioning in rural China. Our paper has three specific objectives. First, we review previous studies on rates of return to human capital and examine why, based on the literature, it can be argued that labor markets are not functioning well. Second, we consider if methodology plays a role in explaining the low estimated rates of return reported in other studies. Finally, we use our data on households that we followed during the past sixteen years to examine whether the returns to education are rising. We seek to show that in our sample, the returns to education among younger workers reached levels found in other countries after 2000.

This set of objectives is extremely broad, and given our data limitations, we narrowed our focus to study the emergence of labor markets through the lens of returns to rural education. In fact, the main contribution of the paper is that we used a new dataset to show how rates of return of rural households have risen steadily, a trend that we can equate with improving labor markets. Although our sample is geographically narrow, we collected our own data on labor market activities and wages on households in the same community over fifteen years (1988–2002). By following the working lives of the same individuals over time, we believe we can help improve the understanding of the evolving nature of labor markets in China. While we also show why previous studies of rates of return to education in rural China are low, because of space limitations we need to draw mostly on the results from our other papers.

Data

We used two sets of primary data in our study. The first is from a national sample of 1,199 households in six provinces and sixty villages in rural China conducted by the authors in late 2000 (dataset 1). In addition to collecting basic information on the farm household land and labor endowment, the survey included detailed information about labor force participation and schooling. Enumerators questioned all household members about their employment and education, including children of the head who are still part of the household. The sample included 3,363 individuals; 1,022 of whom also worked for a wage off the farm.

We also collected data on a set of households in northern Jiangsu in 1988, 1992, 1996 and 2002 (dataset 2). The survey design in 1996 and 2002 were much like that used to collect dataset 1. While the local nature of the sample limits attribution of the findings to the rest of China, the data's high quality and continuity over a fifteen-year time span allow us to examine many questions about the emergence of labor markets.

Several aspects of both household surveys (datasets 1 and 2) are designed specifically to help answer the questions raised in our paper. Hourly wages were computed by taking all monetary earnings over the year (in multiple jobs, if the person held more than one wage earning job) and dividing by the number of hours worked during the year. The survey asked about school participation, eliciting information both about the number of years each individual attended and the final level attained.

Rates of Returns and the Literature's Methodological Shortcomings

High rates of return regularly characterize the relationship between wages and investments into education (Psacharopoulos). In Sub-Saharan Africa and Latin America, where educational attainment ranges between six and eight years, a one dollar investment in schooling returns more than 12% annually in the form of increased wage rates. In Asia, where the average attainment in schooling is higher (about nine years), rates of return range between 8 and 10%.

Curiously, rural China's attainment–returns pattern does not fit that found throughout the rest of the world; in rural China, most of the estimates of the return to schooling are low (table 1, columns 1 to 5). In our search of the literature, we identified six studies of rates of return in rural China that used standard Mincerian methods (Mincer). The average return of the studies is about 4%. Hence, given its average level of educational attainment, China stands out as having one of the lowest rates of return in the world—far below Africa, Latin America, and Asia (Psacharopoulos). If the rates of return were really so low, there would be good reason to believe that labor markets in China have not been functioning well.

There are several methodological reasons, however, why these comparisons may be underestimating the rates of return to human capital investment in rural China. Other work by the authors (de Brauw and Rozelle; Zhang, Rozelle, and Huang) shows that methodological and data issues obscured the measured relationship between wages and educational attainment. For example, none of the other papers in the rural China literature correct for sample selectivity bias. The specification of dependent variable—the wage—also may matter. According to Schultz, estimates of the returns to education based on daily, monthly or annual earnings could underestimate the true returns to schooling. Since hourly income is not affected by the choice of how many hours per day or

Table 1. Returns to education in rural China: Other studies using the Mincer method

Authors (Date)	Definition of Dependent Variable	Time Period of Analysis	Sample Coverage	Returns to Education—Original Findings	Return to Education—Adjusted Methodology ^a
Johnson and Chow (1997)	Yuan/month	1988	Individuals	4.0	5.8
Parish et al. (1995)	Yuan/year	1993	Individuals	1.8–4.3	6.4
Yang (1997)	Yuan/day	1990	Individuals	2.3	6.7
Meng (1996)	Yuan/day	1986–7	TVE workers	0.7–1.1	6.0
Gregory and Meng (1995)	Yuan/day	1986–7	TVE workers	0.7–1.1	6.0

^aIn calculating the “Returns to Education, Adjusted Methodology,” we used the specification of the original authors, but instead of using their variable definitions for the dependent variable (column 2), their time period of analysis (column 3), and their sample coverage (column 4), we estimated the rates of return using our 2000 data on all individuals in the sample (from dataset 1) with the dependent variable (wage) defined as yuan per hour.

days per month to work, it is the preferred measure. Interestingly, none of the studies on rates of return in rural China used hourly wages.

Comparing columns 5 and 6 from table 1 reveals the impact of altering the estimation approach. We used dataset 1 to re-estimate the equations used by the others. We adopted their specifications and geographical regions or subset of wage earners, but also relied on a common dataset and an approach that used hourly wage as the dependent variable and corrected for selection effects. With these methodological changes, we found that the returns rose two to four percentage points (with most of the increase coming from the methodology effect—and only part from the use of the 2000 data).

In addition, descriptive statistics show that wages in 2000 (using dataset 1) and 2002 (using dataset 2) are significantly higher for people with higher education in rural China, especially for the young. Among all individuals with off-farm work, wages are significantly higher for people who attended at least some post-primary school (2.99 yuan per hour) than those who have not (2.48 yuan per hour). Wages also are significantly higher among more educated, younger workers. For example, young migrants with post-primary education have an average wage of 2.89 yuan per hour, compared with only 2.29 yuan per hour for older individuals that did not migrate. According to these observations, the rates of return to human capital in recent years may be higher for labor market participants that are more like those in other developing countries (that is, younger). If such results are found in multivariate analysis (next section), they would be consistent with a hypothesis that better functioning labor markets in recent years are being reflected by rising returns to human capital.

Modeling the Effect of Schooling on Income

To examine if rates of return are rising over time, we estimated rates of return for our sample of households in 2002 and compared them to the same households in 1988, 1992, and 1996. Rates of return for earlier years are reported in Zhang, Rozelle, and Huang. In 1988 and 1992, there was no significant relationship between education attainment and the log of the wage rate (using hourly wage). By 1996, the return for individuals that had achieved the sample's average level of educational attainment had risen to 6%. The rise in rates of return between the late 1980s and the 1990s were consistent with de Brauw's findings of increasingly efficient labor markets.

To find evidence in the Jiangsu sample households, we used a model first proposed by Mincer and modified by a number of authors reported in Psacharopoulos. Education is X_1 (measured as year of education attained), experience is X_2 (which contains two variables—experience in linear and squared form), and training is X_3 (measured as participation in a formal training program or apprenticeship program). The return to schooling for individual i in 2002 can be determined by estimating the following equation:

$$(1) \quad \text{Ln}(\text{Wage})_i = aX_{1i} + bX_{2i} + cX_{3i} + e_i.$$

The rate of return to education is the coefficient on the education variable, a . Our hypothesis involves the size and significance of a . If labor markets are continuing to improve in the late 1990s, a should be significantly different from zero and higher than the rate in 1996.

In order to account for the propensity of certain individuals to select into a wage-earning market, we followed Heckman and also estimated (simultaneously) a participation equation that (following de Brauw) includes a set of control variables X_4 , in addition to X_1 , X_2 , and X_3 . In our estimation, X_4 includes five family characteristics (the number of children; the number of elderly dependents; family size; landsize [in mu]; and household head marital status). These variables are expected to affect the decision of an individual to enter the off-farm wage market, but should have no independent effect on the market-generated wage rate.

The results of the estimation of equation (1) support our hypothesis that labor markets are continuing to improve in rural China (table 2, columns 1 and 2). The

Table 2. Heckman regressions to determine education effect on wage (2002)

	All Individuals		Individual under 35	
	Selection Equation	Wage Equation	Selection Equation	Wage Equation
<i>Number of Observations</i>	312		119	
<i>Human capital</i>				
Years of education	0.117*** (3.358)	0.082** (2.151)	0.076 (1.023)	0.107** (2.148)
Years of experience	0.036 (1.327)	0.006 (0.269)	0.297** (2.741)	0.059 (0.812)
Experience squared	-0.001 (-1.263)	0.000 (0.100)	-0.013*** (-2.921)	-0.002 (-0.608)
Train	1.101*** (5.862)	0.229 (0.678)	1.150*** (4.194)	0.117 (0.338)
<i>Household traits</i>				
Number of kids at home	-0.306 (-1.190)		-0.292 (-0.669)	
Number of elderly at home	0.223 (1.001)		0.344 (0.955)	
Number of family members	0.123 (1.255)		-0.119 (-0.673)	
Land size	0.005 (0.222)		0.050 (1.015)	
Marriage status	0.277 (0.820)		-0.238 (-0.421)	
Constant	-2.492*** (-4.248)	-0.014 (-0.01)	-1.971* (-1.630)	-0.470 (-0.45)
Inverse Mills ratio		0.153 (0.305)		0.253 (0.519)

Notes: *t*-statistics are in parentheses. * indicates statistical significance at the 90% level; ** indicates statistical significance at the 95% level; and *** indicates statistical significance at 99% level. Experience is measured as years since the person left school if they went to school, and age six if they did not. All regressions are done using the two-step method proposed by Heckman (1974) and standard error calculations take the method into account.

coefficient in the regression using all individuals in the sample in 2002 is 0.082 and is statistically significant (row 1). The rate of return, which is higher than for the same households in 1996, shows that human capital has continued to be increasingly rewarded in rural China's labor markets. Like de Brauw, we take this as evidence of improving labor markets.

Also as in de Brauw, we found the rates of return for younger individuals in the sample (those under thirty-five) are even higher (table 2, column 3). The coefficient on the education variable is 0.107, indicating that the rate of return for the younger cohorts is almost exactly what would be considered normal in international comparisons (Psacharopoulos). If this result is representative of all China, the rising rates of return are evidence that labor markets in China are now approaching the level of functionality of the rest of the world.

Conclusions

In this paper, our results go far in reconciling the low rates of return found in earlier studies with the higher ones typically reported for the rest of the developing world. Our paper demonstrates that methodology plays an important role in explaining the low estimates of returns in previous studies. When we define wages on an hourly basis and control for sample selectivity, estimated rates of return rise. In addition, we also show with a sample of households that returns have risen over time. Finally, using households from the same community, the returns rise even more when the sample includes workers with demographic and employment profiles more like those in the rest of the world (i.e., young and working in urban areas). In fact, our paper finds that the returns to education are close to 10% for young wage earners. When looked at in total, our results show the returns to rural education in China are completely consistent with other developing countries (Psacharopoulos).

Finally, these results indicate that China's labor markets are becoming more functional over time. As this happens, increasing educational availability in rural areas would be a good policy instrument for increasing rural incomes. Given the high returns to education that we found for younger workers, China's government would do well to make rural education a top priority.

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