Education and Reform in China

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12 Returns to education in rural China

Alan de Brauw and Scott Rozelle

Through its roles in increasing production and promoting health status, education is considered to be of primary importance to sustained income growth (Schultz 1988; Barro 1991). People who are more educated are not only more efficient producers, they are also better able to communicate effectively and to make more informed choices (Sen 1999). In developing countries, access to education helps the rural poor build their human capital, increasing the value of the most abundant asset of most households, labor.

Within this context, it can be argued that rural education is of particular importance to development in China. In 2004, over 58 percent of China’s population still lived in rural areas, and 46 percent of its economically active population worked in agriculture (NBS 2005). In a land-scarce country such as China, the nation will only truly modernize when its most abundant resource, labor, is made more productive. The importance of education in raising productivity is manifested in two ways: (1) by facilitating the shift of labor from agriculture to industry; and (2) by increasing the returns to labor when individuals find employment.

Despite the imperative of increasing the value of China’s human capital stock in rural areas, the government has not given top priority to rural education in its development plan (Nyberg and Rozelle 1999). Rural education rates are low, only six years on average, compared to more than nine years in the rest of Asia (Psacharopoulos 1994). Moreover, unlike most other developing countries, China spends relatively little on rural education, and that amount is decreasing. China’s government allocated 2.5 percent of GDP to all urban and rural education in 1980, but only 2.2 percent of GDP in 2000 (China National Statistics Bureau 2001). In comparison, other developing countries allocated an average of 3.3 percent of GDP to primary and secondary education in 2000 (World Bank 2001).

One reason for the adverse trend may be that, in China, investments in rural education are widely believed to generate relatively low rates of return. While measured rates of return in the world average in excess of 10 percent and exceed 9 percent in other Asian countries (Psacharopoulos 1994), most studies of education in China have found much lower returns. In the urban economy, until the recent estimates presented in the chapter by Zhang
and Zhao, average returns to education have rarely been found to exceed 5 percent. If anything, studies of education in the rural economy have found even lower returns (Parish et al. 1995; Meng 1996; Zhao 1999). If these studies are accurate, when combined with low average educational attainment levels, China stands out as an anomaly when compared to other countries. For China’s level of average educational attainment, the typical return to a year of education found in the literature is less than half of the rate found in other countries.

Given the importance of education in the development process, such low estimated returns require an explanation. One possibility is simply that the private returns to education in rural China are lower than in other countries. It is possible that, given both its socialist legacy and the current transitional nature of its economy, China’s reformers may have insulated managers from the pressures of markets (Weitzman and Xu 1994). Instead of forcing firms to look for the most qualified and educated workers to fill employment roles, managers may primarily use non-market factors (e.g., guanxi) to assign jobs to workers. When non-market assignment of jobs dominates, then investment in schooling does not lead to higher incomes, and it can be argued that the government should allocate less fiscal resources to school investments in favor of other investments that would lead to higher private and social returns. However, according to this explanation, if markets begin to function well in China, we should expect to see the rates of returns rise.

Alternatively, methodological shortcomings of previous studies could have systematically underestimated educational returns in China. Most studies that have calculated returns to education in rural China either chose a specification or selected a sample that may have contributed to lower estimated rates of return. If, in fact, low estimates of the rates of return to schooling can be attributed to methodology, previous research may have actually contributed to the problem of low educational investment, instead of helping policymakers make more effective rural policy. In response to these shortcomings, use of a more sound methodological approach could produce higher estimates.

In this chapter, our primary goal is to further our understanding of the rates of return to education in China. To accomplish this goal, the chapter has two specific objectives. First, we review previous studies and examine the context in which they were generated. Second, we produce a new set of estimates. The new estimates will have two aims: to examine whether the returns to education are rising over time as China’s markets have developed, and to explore the role that methodological and data shortcomings may have played in producing the lower estimates currently found in the literature. We show that among younger workers, by the late 1990s, the returns to education had reached levels found in other countries. Our finding is consistent with a message to policy-makers that budgetary allocations to education should be increased.

This set of objectives is extremely broad, and given our data limitations, we narrow our focus to studying rural education. While we review a wider set of studies on China’s education, our examination of methodological problems mainly targets studies that have previously used the Mincer (1974) method of analysis.

To meet our objectives, the chapter will proceed as follows. The first two sections examine employment in rural China and review evidence on the relationship between wages and education. The next sections lay out our empirical framework and describe the data set that we use to generate our own estimates of the returns to education. In the results section, we report several new sets of estimates and examine how the estimates change when alternative specifications and samples are used. In the conclusion, we argue that previous low estimates of the returns to education in rural China are due both to weak labor markets, which have strengthened in recent years, and methodology.

Education and employment in rural China

The massive flow of labor into the off-farm sector brought new prosperity to millions of rural households during China’s economic reform era. The proportion of the rural labor force that has found work off-farm rose from around 22 percent in 1988 to 34 percent in 1995 (Rozelle et al. 1999). By 2000, nearly 200 million people, or 43 percent of laborers, held off-farm jobs (de Brauw et al. 2002). The rise in wage earnings and income from self-employed activities can account for most of the increase in rural incomes in the late 1980s and 1990s (Parish et al. 1995).

Rural labor markets, however, do more for the development process than just providing a means for raising rural incomes (Todaro 1976). For China to develop successfully, labor markets must function well enough to facilitate the shift from a largely rural population to an urban one. As the rates of return to education are an indicator of the health and extent of labor markets, estimates of the rates of return can help evaluate their development. In determining their priorities with regards to economic development policy, China’s leaders should be interested in knowing whether labor markets are developing in a way that rewards households and individuals for going to school, and may gauge their level of investment based on the returns being realized.

Although the focus of a considerable amount of research, scholars do not agree on the role that labor markets have played in contributing to China’s economic growth during the first two decades of reform. 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. For example, Benjamin and Brandt (1997) and Liu et al. (1998) provide evidence that on-farm labor markets did not function well during the 1990s. Others have focused on the hukou system and other institutional barriers and the constraints they place on the movement of labor, despite large wage gaps and positive expected gains from migration. Malley (2000) and Yang and Zhou
Wages, education, and previous estimates of the returns to education

If the relationship between education, access to employment and wages reflects the nature of labor markets, the record in the literature on China is somewhat mixed. Although the estimates of returns to education that appear in the literature indicate that they are lower than elsewhere in the world, several authors have found that education increases the probability of finding an off-farm job (e.g. Zhang et al. 1995, Zhao 1999). Furthermore, several more recent estimates indicate that returns may be increasing (Benjamin and Brandt 1997; Zhang et al. 2002).

Studies of the rural economy have found low returns compared with urban China and the rest of the world (de Brauw et al. 2002). Previous studies using the traditional Mincer method of estimating returns to education summarily find low returns. Parish et al. (1995) and Johnson and Chow (1997) use nationally representative samples of individuals and find that the returns to education range between 1.8 to 4.3 percent. Examining individual workers in Sichuan province, Yang (1997) estimates that the return to education is only 2.3 percent. Meng (1996), Gregory and Meng (1995), and Ho et al. (2002) only examine workers in local enterprises in rural areas (i.e. those working in township and village enterprises) and find average returns of less than 5 percent. A number of other studies use other methods to examine the returns to education in rural samples and find average returns far below 5 percent (e.g. Zhao 1997, Hare 1999, Li and Zhang 1998, Zhao 1999, Yang and An 2002). In fact, with the exception of the estimates of Ho et al. (2002: 5.1 percent); Benjamin et al. (2002: 6.6 percent); and Zhang et al. (2002), who find a return of 9 percent between 1996 and 2002, there are no findings of returns to education above 5 percent.

In contrast, other studies have found compelling evidence of the importance of education to the rural workforce. A number of studies have documented the effectiveness of education in facilitating access to off-farm work. Zhao (1997), Zhang et al. (2002), and de Brauw et al. (2002) find that education has a positive and statistically significant influence on the probability that rural individuals can find a job. In fact, the survey data of Zhang et al. (2002) clearly show a positive and increasing relationship between education and off-farm employment. In all three years of the survey in seven northern Jiangsu villages—1988, 1992, and 1996—individuals with a middle school education and above had higher off-farm participation rates (Table 12.1). Perhaps more importantly, the difference between those with less and those with more education grew sharply over time. In 1988 and 1992 the off-farm participation rates of those with middle school or above exceeded the rates of those with less education by around 50 percent, and this gap rose to more than 100 percent by 1996.

In our northern Jiangsu sample, the relationship between education and wages strengthened between 1988 and 1996 (Table 12.2). In the late 1980s, wages for middle school graduates and above were actually lower than wages for those who had only graduated from elementary school, at least among older workers. By the mid-1990s, however, a sharp reversal had occurred. For all age groups, workers with a middle school education and above earned more on a per day basis than those with only an elementary education. Across all age categories, the real wage rose more than 10 percent faster annually between 1988 and 1996 for those with higher education levels compared to those with only elementary schooling.

In summary, then, it is not difficult to understand why researchers disagree regarding the nature of China’s off-farm labor markets. Most econometric studies have recorded low measures of the returns to education. However, there are two reasons to believe that labor markets have begun to function better. Education has, or has begun to have, a positive effect on off-farm

Table 12.1 Labor market participation and education in Jiangsu Province, 1988, 1992, and 1996

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Off-farm work (percentage in workforce)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary school</td>
<td>41</td>
<td>33</td>
<td>33</td>
</tr>
<tr>
<td>Middle school and above</td>
<td>62</td>
<td>49</td>
<td>69</td>
</tr>
<tr>
<td>On-farm work (days worked per year)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary school</td>
<td>67</td>
<td>113</td>
<td>80</td>
</tr>
<tr>
<td>Middle school and above</td>
<td>28</td>
<td>45</td>
<td>29</td>
</tr>
</tbody>
</table>

Source: Authors’ survey.
Table 12.2 Wages by education and age in Jiangsu Province, 1988, 1992, and 1996

<table>
<thead>
<tr>
<th>Age group</th>
<th>Level of education</th>
<th>1988</th>
<th>1992</th>
<th>1996</th>
</tr>
</thead>
<tbody>
<tr>
<td>Young</td>
<td>Primary school</td>
<td>3.4</td>
<td>3.2</td>
<td>7.8</td>
</tr>
<tr>
<td></td>
<td>Middle school and above</td>
<td>4.3</td>
<td>4.3</td>
<td>11.7</td>
</tr>
<tr>
<td>Middle aged</td>
<td>Primary school</td>
<td>10.2</td>
<td>5.5</td>
<td>14.7</td>
</tr>
<tr>
<td></td>
<td>Middle school and above</td>
<td>4.0</td>
<td>4.5</td>
<td>20.9</td>
</tr>
<tr>
<td>Old</td>
<td>Primary school</td>
<td>11.0</td>
<td>5.7</td>
<td>4.5</td>
</tr>
<tr>
<td></td>
<td>Middle school and above</td>
<td>4.9</td>
<td>7.7</td>
<td>6.3</td>
</tr>
</tbody>
</table>

Source: Authors' survey.

Note: The young are those between 16 and 30; the middle aged are those between 31 and 50; the old are those between 51 and 65. Wages in yuan.

participation. And furthermore, based on our descriptive statistics, more educated workers seem to earn a premium for their education, at least in recent years.

Some of the disagreement between previous measures of the returns to education and our descriptive analysis may be due to the timing of different studies. In this way, it is plausible that both sides of the debate are correct. Different sets of researchers may be describing two different economies—one in the early reforms, in which markets played only a marginal role, and another economy in the later reforms, when the private sector and markets began to dominate the economy. China's rural economy, in particular, has evolved remarkably over the past two decades. In the 1980s and early 1990s, decision-making in rural enterprises was heavily influenced by officials who were likely considering a number of non-market factors (Naughton 1995; Nyberg and Rozelle 1999).

In an economy with such rapidly emerging markets, it may not be surprising that returns to education were low during the early reform period, but have risen since. During the past ten years, several authors have shown that rural enterprises now operate in an increasingly competitive environment in which most managers have had fairly good incentives to respond to market signals (Jin and Qian 1998; Chen and Rozelle 1999; Li 2003). These changes may be showing up in more recent estimates of the returns to education. Not surprisingly, studies that found the highest returns use the most recently collected data (Benjamin et al. 2002; Ho et al. 2002).

However, when one takes a closer look at the studies that have estimated low returns, one questions whether the estimates also are low in part due to the methods or the nature of the sample being analyzed. In several studies, the method of measuring wages may have a negative effect on the estimated returns to education. In countries with underdeveloped financial markets, such as China, poorer people may drop out of school because they cannot finance the earnings they forego to attend school, while richer people can continue as they wish (Schultz 1988). Hence, richer people may systematically have more education. Moreover, once the rich and poor complete their education, differences in wealth endowments, which are associated with differences in preferences for leisure and tolerances for risk, may mean that the poor have to work more. The poor may have to work both more hours per day and/ or more days per month or year. As a result, 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 choices regarding the number of hours per day or days per month to work, it is the preferred measure (Schultz 1988; Card 1999). None of the previous Mincerian studies of rates of return in rural China use hourly wages.

The selection of the sample for some of these studies may also affect the measured relationship between wages and completed education. Several papers only consider workers in one industry or sector of the economy (Gregory and Meng 1995; Meng 1996; Ho et al. 2002). If that sector of the economy had lower rates of return to education than other sectors, perhaps for institutional reasons, national estimates drawn from such studies would not be representative. In addition, Becker (1964) warns that estimates of educational returns will be low if particular groups of workers are singled out for estimation, because the effect of selection into that portion of the off-farm labor force is ignored. Only one paper in the rural China literature corrects for sample selectivity bias (Zhang et al. 2002).

Empirical framework

To analyze the determinants of off-farm wages, we use the two-step model developed by Heckman (1974). The Heckman model avoids a possible bias that may result from excluding individuals from the sample who choose not to work for wages. Individuals choose whether or not to work for wages, and as a result ordinary least squares (OLS) estimation of the determinants of wages drops people who do not work for wages from estimation. However, individuals who choose not to enter the off-farm labor market believe the wage they would receive is lower than their reservation wage, or the wage they implicitly earn farming, in self-employment, or in doing tasks around the household. By dropping these people, the sample is not random, and so OLS estimates are not representative of the population as a whole. The Heckman two-step model allows us to include all individuals of working age in the analysis, avoiding sample selection bias and allowing us to interpret our results as applying to the entire sample.

In the first estimation step, we estimate a probit equation to determine whether or not an individual enters the off-farm labor market. We use two sets of variables to determine whether an individual enters the wage-earning labor force. The first set of explanatory variables are human capital characteristics, which include the years of education attained, work experience, and work experience squared, and an indicator variable that is 1 if the individual
participated in a training or apprenticeship program, and 0 otherwise. The second set of explanatory variables are measures that may affect whether or not an individual decides to work off-farm, but should not affect the wage rate. These variables include an indicator variable for the marital status of each individual, the household size, and the household land endowment, which is the amount of land allocated to the household by the village. The results are used to calculate a sample selection correction term, an inverse Mills ratio, which then enters the second stage of estimation.

In the second step, we investigate the determinants of wages. We use the logarithm of the hourly wage as the dependent variable, and the explanatory variables are the same as the first set of explanatory variables used in the first step of estimation. As a result, our estimates exactly follow the Mincer (1974) method of estimating the returns to education, which has literally been used hundreds of times to measure the returns to education (Psacharopoulos 1994). By using the hourly wage as our dependent variable rather than the daily or monthly wage and controlling for potential sample selection bias, we generate an estimate for the coefficient on the education variable that controls for both of the methodological factors we identified as possible shortcomings of the previous studies. We also address the representativeness of the previous samples by using our estimating framework on a sample that includes all rural workers, rather than a sample from a single sector of the rural off-farm labor force.

In addition to estimating the basic model defined by these equations, we perform a number of exercises to examine the returns to education within certain groups in the population. Specifically, because of the increasing importance of the migrant sector of the off-farm labor force, we examine the returns within this sector separately. This exercise may help to reconcile China's results with the returns to education in other countries, given that an overwhelmingly large fraction of the off-farm employment in other countries is in the migrant sector. In China, rural industry employs an unusually large portion of the population, whereas in other countries, workers who move off-farm must typically leave rural areas. To make our estimates even more comparable with other countries, and to control for possible differences in returns to education that might occur because of differences in the quality of education for those schooled during and after the Cultural Revolution, we also examine the effects of education on the wage rates of individuals under the age of 35 (henceforth, young wage earners).

Finally, we conduct two robustness checks on our results, to make sure that other biases that have been discussed in the broader literature do not affect our results (Schultz 1988; Card 1999). These robustness checks involve controls for individual ability and for school quality. To control for potential individual ability bias, we add variables that measure the grades that each person received in their final year of schooling, and their father's educational level. To control for a potential bias that results from differences in school quality, we sequentially add seven variables to a modified model that may measure school quality: the student-teacher ratio, average class size, the average education, experience, and wages of teachers, average expenditures per student, and an indicator variable for whether or not the school had a library. To match up school quality variables with times that individuals were in school, the quality variables are measured in 1990 and these regressions are only estimated for individuals aged 35 and under who were raised in the village.

Data

The data set used in this chapter is from a national sample of 1,199 households in six provinces and 60 villages in rural China conducted by the authors in late 2000. In addition to collecting basic information on the farm household land and labor endowments, and other production-oriented activities, the survey included sections to collect 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, but did not include children, individuals in school, and the elderly who no longer work. In total, the sample includes 3,363 individuals. Of those, 1,022 individuals worked for a wage off the farm, and 2,341 did not.

Several aspects of both the household and village level surveys are designed specifically to help answer the questions raised in our chapter. Hourly wages were computed by taking all monetary earnings over the course of 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 of schooling each individual attended and the final level of schooling attainment. Our questionnaire also asks respondents to identify if they lived at home while they were working or if they lived away from home, so we could categorize each worker as either a migrant or a local wage earner. To get proxics of individual ability, enumerators asked the respondent about the grades that each person received in the last year of their schooling (good, average, or poor), as well as the years of schooling attained by each person's father. A companion school survey was asked of each village primary school to construct variables measuring school quality.

Results

We estimated the system defined by the two equations to generate estimates of the rate of return to education (Table 12.3). Most of the coefficients are of the expected sign, strongly statistically significant, and robust across specifications. In particular, as described by other authors who examined the determinants of participation in the off-farm labor market (Zhao 1997), education has a strong effect on selection into the off-farm labor force. At
Table 12.3 Effects of education and experience on off-farm wages

<table>
<thead>
<tr>
<th>Explanatory variables</th>
<th>All individuals</th>
<th>Individuals 35 and under</th>
<th>Individuals over 35</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Selection equation</td>
<td>Wage equation</td>
<td>Selection equation</td>
</tr>
<tr>
<td>Years of education</td>
<td>0.018**</td>
<td>0.064**</td>
<td>0.022**</td>
</tr>
<tr>
<td></td>
<td>(5.90)**</td>
<td>(7.06)**</td>
<td>(3.48)**</td>
</tr>
<tr>
<td>Years of experience</td>
<td>0.002</td>
<td>0.032**</td>
<td>0.023**</td>
</tr>
<tr>
<td></td>
<td>(0.61)**</td>
<td>(5.63)**</td>
<td>(2.66)**</td>
</tr>
<tr>
<td>Experience, squared</td>
<td>-0.012**</td>
<td>-0.047**</td>
<td>-0.080**</td>
</tr>
<tr>
<td>(100)</td>
<td>(2.82)**</td>
<td>(4.96)**</td>
<td>(2.49)**</td>
</tr>
<tr>
<td>Skill training?</td>
<td>0.114</td>
<td>0.117**</td>
<td>0.109**</td>
</tr>
<tr>
<td></td>
<td>(5.52)**</td>
<td>(2.17)**</td>
<td>(3.44)**</td>
</tr>
</tbody>
</table>

Instruments

Married?              -0.238            -0.350           -0.012
(1 = yes)             (7.51)**         (8.84)**        (0.24)
Household size        0.000            0.000           0.001
(0.13)                (0.03)           (0.11)
Land                  -0.004           -0.004**        -0.003
(2.39)**              (1.83)**        (0.11)
Inverse Mills ratio   -0.000**        -0.180**        -0.090
(0.00)                (1.34)           (0.14)

Notes: *-statistics are in parentheses. **indicates significance at the 90 percent level. ***indicates significance at the 95 percent level. Provincial fixed effects are included in all equations. Experience is measured as years since the person left school if they went to school, and age 6 if they did not. All regressions are done using the two-step method proposed by Heckman (1976) and standard error calculations take the method into account. 3,363 observations are included in columns 1-2; 1,513 observations are included in columns 3-4; and 1,850 observations are included in columns 5-6.

the mean level of education in the sample, given another year of education, a person becomes 1.8 percent more likely to find an off-farm job (row 1, column 1).

In addition to facilitating the process of finding an off-farm job, education has a positive and highly significant effect on hourly wages. When we used the entire sample, we found that the average return to a year of education is 6.4 percent (row 1, column 2). This coefficient implies that averaged across all of China, all age cohorts and sectors of the off-farm labor market, individuals in the rural economy who work off-farm receive 6.4 percent higher wages for every additional year of schooling.

The average returns to education, however, mask differences between age cohorts. Among young wage earners, the estimated returns to education are higher. Individuals below 35 years old receive, on average, 9.3 percent higher wages for each additional year of schooling (row 1, column 4). In contrast, the returns for those over 35 are statistically insignificant (row 1, column 6). The difference between estimated returns for younger and older workers may indicate that younger workers are much more mobile than older workers and that education is becoming increasingly important for new jobs in the labor market. One explanation for the low returns found among workers aged over 35 may be the low or different quality of education during the Cultural Revolution and earlier.

However, even when averaging across the whole sample, our estimated returns, 6.4 percent, are higher than estimates found in other nationally representative samples of rural areas (those studies discussed above). It could be that the higher rates of return that we find are primarily a function of the fact that our data are more recent, and that returns have been increasing over time. However, our estimate may be higher in part because of our methodology. In another paper, we decompose the gap between our findings and the average estimate in the current literature into a timing effect and a measurement effect (de Brauw and Rozelle 2006). In that paper, we demonstrate that 1.5 percentage points of the difference between the average return found in the literature (2.3 percent) and our findings (6.4 percent) is due to a difference in the timing of studies. In other words, when comparing the estimates of the previous authors with calculations that use their specifications but our more recent data, the average returns rise from 2.3 to 3.8 percent. One interpretation of this rise is that it is due to the increased competition that has emerged in the rural economy during the 1990s. As markets have developed, it is possible that farm managers have begun to reward human capital more as they search for greater efficiency.

When we make further corrections to other authors' specifications, by using hourly wages as the dependent variable and by correcting for potential sample selectivity bias, we account for most of the rest of the gap between the average of other estimates and our estimate. After these corrections are made, the average return across other authors' specifications is 6.2 percent, which is nearly identical to our estimate (6.4 percent). Accounting for the methodological concerns, therefore, increases returns even more (2.4 percentage points) than accounting for the difference in timing of studies (1.5 percentage points).

Using our data and specifications in equations (1) and (2), we also show that migrants receive an even higher return to their education than other sectors of the rural economy (Table 12.4). When we restrict wage earners to migrants, we find that the returns to education rise to 8.3 percent (column 2). In contrast, in the local wage-earning sector, the average rate of return for a year of education is only 5.2 percent (column 4). Most noteworthy (although not shown here), among young migrants, the estimated rates of return are even higher, at 11.1 percent. Hence, our findings imply that the rates of return for China's rural workers are higher for younger workers and for those who migrate, and are particularly high for young migrants. Given that much of the off-farm labor force in the rest of Asia (and the world, for that matter) is typically young and that the main off-farm jobs outside of China are found in cities (unlike China that has developed a large rural industrial sector), our
Table 12.4 Heckman regressions to determine effect of migration or local wage-earning status on hourly wages

<table>
<thead>
<tr>
<th>Explanatory variables</th>
<th>All migrants</th>
<th>All local wage earners</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Selection equation</td>
<td>Wage equation</td>
</tr>
<tr>
<td>Years of education</td>
<td>0.002</td>
<td>0.083</td>
</tr>
<tr>
<td></td>
<td>(1.13)**</td>
<td>(7.73)**</td>
</tr>
<tr>
<td>Years of experience</td>
<td>-0.005</td>
<td>0.038</td>
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<tr>
<td></td>
<td>(2.74)**</td>
<td>(3.48)**</td>
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<td>Experience, squared</td>
<td>-0.001</td>
<td>-0.070</td>
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<td></td>
<td>(0.46)</td>
<td>(4.02)**</td>
</tr>
<tr>
<td>Skill training?</td>
<td>0.065</td>
<td>0.106</td>
</tr>
<tr>
<td></td>
<td>(4.07)**</td>
<td>(1.62)</td>
</tr>
<tr>
<td>Instruments</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married? (1 = yes)</td>
<td>-0.016</td>
<td>-0.020</td>
</tr>
<tr>
<td></td>
<td>(6.31)**</td>
<td>(0.80)</td>
</tr>
<tr>
<td>Household size</td>
<td>0.004</td>
<td>0.005</td>
</tr>
<tr>
<td></td>
<td>(0.88)</td>
<td>(0.62)</td>
</tr>
<tr>
<td>Land endowment</td>
<td>-0.001</td>
<td>-0.002</td>
</tr>
<tr>
<td></td>
<td>(1.32)</td>
<td>(1.03)</td>
</tr>
<tr>
<td>Inverse Mills ratio</td>
<td>0.086</td>
<td>0.076</td>
</tr>
<tr>
<td></td>
<td>(0.55)</td>
<td>(0.16)</td>
</tr>
</tbody>
</table>

Note: t-statistics are in parentheses.
* indicates statistical significance at the 90 percent level; ** indicates statistical significance at the 95 percent level. Provincial fixed effects are included in all equations. Experience is measured as years since the person left school if they went to school, and age 6 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. 2,363 observations are included in the regressions.

estimates for these subsets of China's workforce may be more comparable to those found in the rest of the developing world, in general, and for those found in the rest of Asia, in particular.

The results of our analysis are found to be robust to two further tests that are designed to control for other effects that might be expected to affect rates of return. First, we test whether individual ability might affect the estimated returns to education (Table 12.5). When we add the three measures of ability to the base equations, we find that although having had good grades facilitated entry into the off-farm labor market (row 4, column 1), none of the ability measures directly affect the wage level (column 2). Even more importantly, we find that the estimates of the rate of return are nearly the same with and without the measures of ability, for the sample of all workers as well as the sample of young wage earners. As a result, we conclude that individual ability bias does not affect our estimates.

Second, we test whether our estimates are influenced by the inclusion of a measure of school quality. Since school quality would directly affect the return, we follow Behrman and Birdsall (1983) and interact the quality measure with educational attainment. Since we have no a priori expectation about which measure of school quality is best, we estimated the model seven times, each time using a different measure of school quality. Estimates of the coefficients for the interaction terms were never statistically significant. Most importantly, though, neither the estimated return to primary education nor the estimated return to post-primary education was affected significantly in any of the specifications, implying that differences in school quality across villages also do not substantially affect our results.
Conclusion

In this chapter, we have used a nearly nationally representative sample of workers in rural China to estimate the returns to education in off-farm work in 2000. Making corrections for selectivity into off-farm work and using the hourly wage rate, we find that across all individuals with off-farm jobs in our sample, the mean return to a year of education is 6.4 percent. The estimates are shown to be robust to controls for individual ability and for village primary school quality.

More importantly, our results go far in reconciling the low rates of return found in earlier studies with the higher ones that are typically found for the rest of the developing world. Experiments reported in de Brauw and Rozelle (2006) and summarized here demonstrate that returns have risen over time. The notion of increasing returns is also consistent with Zhang et al. (2002), who use a panel to show that returns to education rise over the reform period and claim that the improvement is likely due to improving labor markets.

We further find evidence that methodology has played an important role in the low estimates of returns in previous studies. When we define wages on an hourly basis, control for sample selectivity, and use a representative sample, the rates of return rise further. Finally, when the sample is used that includes workers who have demographic and employment profiles more like those found in the rest of the world (i.e. young and working in urban areas), the returns rise even more. In fact, when we find that the returns to a year of schooling are close to 10 percent for young wage earners and over 10 percent for those who work as migrants. These findings put China on a level that makes the returns to rural education very consistent with those in other developing countries (Psacharopoulos 1994).

Finally, these results strongly indicate that increasing access to education in rural areas would be a good policy instrument to increase rural incomes. Given the high returns to education that we find for younger workers, China's government would do well to make rural education a top priority, especially since the majority of children in China today are being raised in rural areas.

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Notes

1 See Zhang and Zhao's Chapter 14 in this volume for a review of this literature.
2 The Mincer (1974) method involves regressing the logarithm of the wage rate against education, years of work experience, and years of work experience squared, as returns to experience have been found to be concave. Since experience is often not directly observable, it is typically defined as experience = age - education - 6. Typically, studies that use the Mincer specification add other explanatory variables as well.
3 We include provincial dummy variables in both equations as well.
4 Furthermore, as we are limited to data on primary school quality, we further hypothesize that school quality will only affect returns to primary school, and adjust our estimation framework accordingly.
5 The average is taken only over studies that also use the Mincer method.

References


