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Education, Migration and Source Community Incomes in Rural China

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Abstract

Residents in rural China doubt the benefits from education, yet there is empirical evidence supporting positive effects in urban and rural areas. This paper investigates whether education affects a variety of income attainment indicators for households in rural China, using a household survey from the provinces of Hebei and Liaoning. The analysis estimates education effects for household residents, but also for temporary migrants (rural-urban migrants) and children who have moved permanently (rural-rural migrants). This can help to answer a set of three related questions: 1) Does household welfare in rural China depend on education? 2) Is the effect of education contingent on the decision to migrate? and 3) Does education have dissimilar effect for rural-urban and rural-rural migrants? The results support that education has positive income effects and that migration yields no additional payoffs. However, there is no evidence that households benefit from higher education if migration is only temporary. Altogether, this signals positive payoffs of educational expenses to rural households but households which consider sending a migrant into the urban labor force are better off if the more educated stay at home.

1   Introduction

Developing countries struggle with the challenge to provide basic education for their citizens. Although many countries have progressed substantially in enrolling pupils into primary school, 86 countries are still unlikely to meet the Millenium Development Goals of basic primary education for all in 2015 (Bruns, Mingat and Rakotomalala, 2003 pp. 61). East Asia and the Pacific, however, rather face the challenge to ensure access to secondary education. The People's Republic of China mimics the region fairly well with gross enrollment rates for primary and secondary school of 118 and 73 percent in 2004, respectively.[1] These drop-outs, which mainly occur in rural areas, have started to attract academic interest (see e.g. Liang, 2001; Liu, 2004; Wang, 2005).

Primary education is not enough to ensure sustained economic growth in a knowledge-driven society (Schleicher, 2000; Bennel and Furlong, 1998). Similar arguments encouraged Chinese policymakers to implement "The Law of Compulsory Education" in 1986, which seeks to guarantee nine years of compulsory education for everyone. Despite major progress in school enrollment, the law has not, until this day, been fully implemented. In interviews with families from Weichang County in Hebei, one of China's northeastern coastal provinces, the most frequently mentioned reason for dropping out was that students were tired of going to school (Liu, 2004). Several parents were also concerned about the low quality of rural schools and wanted their children to drop out because of the high costs associated with keeping them there.

Inspired by these survey results indicating relatively high opportunity costs, this paper explores the effect of education on rural income attainment. First, it poses the question of whether the education of people who are residing in the households is a significant determinant of rural household incomes. Second, since many of China's rural population eventually become migrant workers, the paper also consider the educational levels of people who have moved from the households. Migration can affect source community incomes in several ways: On the one hand, source communities may receive and benefit from

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[1] World Development Indicators as of November 27th 2007

remittances. On the other hand, migration may have negative productivity effects if other household members cannot appropriately replace migrants. An objective of this paper is to assess whether the migrants' levels of education are of importance in these contexts.

Studies on the role of education covering the early years of post-Mao China generally suggest low returns to education (e.g. Byrin and Manalot, 1990; Jamison and Van der Gaag, 1987), but recent evidence supports its increasing importance both in urban and rural areas (e.g. Meng, 1995; Zhang et. al, 2002; Maurier-Faazio,1999). Another vein of research analyzes the economic consequences of migration in China, but little attention has been devoted to the analysis of income effects on source communities. Empirical work has so far primarily focused on temporary migrants (individuals who move to the cities to work temporarily and return to the countryside after a relatively short period of time). Du, Wang and Park (2005) find evidence of positive effects from temporary migration in rural China. DeBrauw *et al.* (2003) show that temporary migration has an immediate negative effect as it reduces crop income. The long-run effect, however, may be positive since remittances may be used for productive investments.

Research on income effects from permanent migration in China is rare in the academic literature, yet there are good reasons to include them. The New Economics of Labor Migration (NELM) suggests that households send migrants to differentiate the households' sources of incomes and to generate means for necessary investments if capital markets in the home community are incomplete and the possibility of borrowing money is limited (Stark and Bloom, 1985). The NELM strand is often argued to best explain the occurrence of temporary migration since migrants are likely to remit more if they intend to return.[2] However, not only temporary migrants remit. Schiller (1999) finds that migrants often keep remitting to their families even when they have permanently settled elsewhere, which is an argument to also include permanent migration into the analysis.

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[2] The household and the migrant are assumed to agree on a mutual benefical contract where the migrant is expected to remit. The bargaining power of each party affects the self-enforcing properties of the contract. The higher the bargaining power of the family, which is arguably higher if the migrant intends to return, the higher the motivation for the migrant to remit (see e.g. Rapoport andDocquier, 2005 and Stark and Bloom, 1985)

The objective of this paper is to investigate whether education has an impact on rural household income in China. It incorporates not only the level of education of individuals living in the households but also people who have moved out (migrants and outmovers). It contributes to the literature on migration effects on source communities and the importance of education in rural China along two dimensions. First, it compares the income effects (i.e. on household income) of the educational levels of people who have moved and people who are residing in the households. Second, it incorporates not only temporary migrants, but also permanent migrants into the analysis, which offers insights into three related questions: 1) Does rural household welfare in China depend on education? 2) Is the effect of education contingent on the decision to migrate? and 3) Does education have dissimilar importance for temporary and permanent migrants? The dual nature of China's labor market discourages rural-urban migrants from permanently settling in the cities. They are usually denied the right to social benefits while living there. City governments have implemented policies to protect the urban labor force from having to compete with rural-urban migrants. Such policies include reserving certain positions for urban residents and imposing quotas that restrict the number of migrants firms can employ (Knight and Song, 2005). Rural-urban migrants are usually employed in low-skilled jobs that residents with urban status do not want. Hence, one would not expect education to significantly affect either their probability of employment or the level of their wages. However, Knight and Song (2005) find that education is a significant but small determinant of rural-urban migrants' wages in Beijing, Shenzhen, Wuhan and Suzhou. In the context of the ongoing development and Chinese split labor market, this suggests that rural-urban migrants may also benefit from the increasing demand for skilled labor.

The paper makes use of a household survey, collected by the World Bank in 1995 (Rozelle *et al.*), in which 787 farm households were interviewed in Hebei and Liaoning provinces. Although the data is not a random sample and therefore not nationally representative, it has comprehensive information about migration, which makes it particularly appropriate to use in this paper. The data set has previously been used by DeBrauw, *et al.* (1999; 2003). Both studies focus on how source communities are affected by temporary migration but exclude household members who have moved permanently. Moreover, they do not consider the

education levels of the migrants. The next section briefly reviews post-Mao developments and reforms of the Chinese economy. Methodological issues are discussed in section 3. Section 4 presents the data and the results. Section 5 concludes the paper.

2   Post-Mao Reforms

Rural residents in China have significantly higher chances to find non-farm employment today compared to the pre-reform period. A series of market-oriented reforms caused agricultural production to increase dramatically between 1978 and 1984. Most importantly, the household responsibility system, which was initiated in 1979, replaced collective farming and contracted land and output quotas to households rather than production teams (see e.g. Lin, 1992). Moreover, the state offered higher crop procurement prices to farmers and allowed them to sell their entire produced crop surplus (i.e. exceeding the state-quota) in the free market. All in all, farmers responded to these new incentives by increasing their production. In the initial years between 1978 and 1985, the total output of crops, rice and wheat increased by 29 percent.[3]

The increased efficiency in agriculture released labor for non-farm activities, which spurred the growth of industrial Township Village Enterprises (TVE). TVEs are rural local enterprises either run by community governments or as individual and private enterprises under the formal registration of a TVE (Knight and Song, 2005). They were specifically propagated to absorb agricultural surplus labor and to avoid massive population flows from rural areas into the cities. Between 1979 and 1993, the TVE share of national industrial output increased from 9 to 27 percent (Jing and Qian, 1998). Employment in TVEs rose from 30 million to 135 million between 1980 and 1996 (Ping, 2005).

Despite increasing chances of non-farm employment in the countryside, TVEs were not able to absorb all the surplus labor released from agriculture. Increasing foreign investments in the coastal areas accompanied by rising unemployment in the countryside, initiated massive rural-urban population movements. During the Mao era, the national household registration

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[3] Author's Calculations and National Bureau of Statistics of China, www.stats.gov.cn. Total output increased from 246 720 000 to 318 210 000 tons.

system (hukou-system) only allowed migration if sanctioned by the government. It usually ordered people to move permanently mainly because of job attainment and higher education and granted the migrants citizenship and the right to social benefits at the destination. The household registration system kept track of each citizen and obliged them to remain at their registered residence (Yang, 2000). Unauthorized migration was rare and usually ended up in deportation back to the registered place of residence. During the 1980s, however, the effectiveness of mobility control declined due to increasing marketization and decreasing reliance on the state redistributive sector. The government also responded to the increasing underemployment in rural areas by allowing, or at least tolerating, rural-urban migration. Subsequently, local governments also took policy actions to facilitate migration. In 1992, for instance, the Chinese government dismantled the urban food rationing system to ensure food supply for migrants in the cities (McEarlan and Wu, 2003).

Market reforms have also resulted in liberalized labor recruitment policies. Workers in pre-reform China were bureaucratically assigned positions in enterprises where they generally enjoyed life-time employment. Today, however, labor markets are expanding and workers compete for vacancies with experience and education (Maurier-Fazio, 1999). Based on household surveys from 1988, 1992 and 1996, Zhang *et al.* (2002) find that education is becoming an increasingly important wage determinant that also increases the chances for non-farm employment in rural areas. Meng (1995) shows that education has a significant effect on wages for people who have obtained their jobs through the labor market and actively applied for them. However, education does not significantly affect wages for people who have been assigned their jobs by the community authorities. Since a growing share of the Chinese labor force find jobs through the expanding labor market, education should evolve into a decisive factor for an increasing number of people.

Although rural-urban migration is considerably easier today than it was during the Mao era, rural-urban migrants remain deprived compared with citizens with an urban household registration. Rural-urban migrants typically find only low-skilled jobs and are denied health care, unemployment insurance, pensions and education for their children. They have poor

working conditions and low wages compared to urban residents (see e.g. Wang and Zuo, 1999; Chan *et al.,* 1999; Shen, 2002).

Estimates of the size of the "floating population" range from 120 to 150 million people (Pan, 2002). Whereas the Hukou-system still discourages rural-urban migration, people are often permitted to move between rural areas or between different cities (Chan *et al.,* 1999). Permanent migration with official change in residence is therefore typically limited to changes either within rural areas or between different cities. As the number of temporary migrants has increased dramatically due to changing migration policies during the post-Mao period, the rate of permanent migration has remained relatively constant at two percent of the total population (Yang, 2000). The empirical analysis will distinguish between temporary migrants and permanent migrants. People who have moved on a temporary basis are assumed to represent rural-urban migrants, whereas the absolute majority of permanent migrants are likely to have moved between rural areas.

3   Methodology

3.1   *The Model*

Education can help to increase individuals' abilities and/or signal ability to employers and hence positively affect wages and the probability of employment (see e.g. Borjas, 2002).[4] Migrants with high education should be able to remit more, if education positively affects their income. There are also potential negative effects from migration. If there is a shortage of labour in the household, migration reduces available manpower for household work. There is also the possibility that households must remit money to the migrants (see e.g. Rapoport and Docquier, 2006). Finally, migrants may simply replace original employment in the home village with other jobs at the destination. The earning difference affects the migrants' ability to make monetary contributions to the household.

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[4] If there are unobserved differences in ability between workers in different segments of the population, e.g. between highly and lowly educated workers, earning differences will not only reflect returns to education. This is usually referred to as an "ability bias".

Equations *2.1-2.4* estimate whether the education of family members and migrants affects total household incomes, remittances, non-farm incomes and farm incomes. All incomes are measured in per capita terms and reflect household earnings in the survey year of 1994. The number of individuals with secondary and high school education in each household are denoted *ES* and *EH*, respectively. Migrants are classified as temporary migrants (M^T), permanent migrants (M^P) or outmovers (M^o). They are divided into three categories according to their level of education Primary School (1-6 years), Secondary School (7-9 years) and High School (>9 years)). Temporary migrants are household members who spent three months or more away from the household during the survey year. Permanent migrants are children of the head or spouse of the household who have moved from the village. Outmovers are children who have left the household but still live in the same village. Other variables control for household (*H*) and regional characteristics (*R*) which that affect the productivity of family members, the chances to find non-farm employment and the need for remittances. Besides, remittances received and sent by each household may be dependent on norms and traditions in the local community. The village average of household net remittances (*T*) controls for this in equation 2.2.

Equation 2.1 estimates the impact of migration and education on aggregated household incomes. *ln(Y_{ij})* is the natural logarithm of the per-capita income of household *i* living in region *j*. ε_{ij} is the error term. Household expenditures during 1994 approximate income.

$$ln\ (Y_{ij}) = \alpha + \beta_o ES_{ij} + \beta_1 EH_{ij} + \beta_2 M_i^T + \beta_3 M_i^P$$
$$+ \beta_4 M_i^O + \beta_6 H_{ij} + \beta_6 R_{ij} + \varepsilon_{ij} \qquad (2.1)$$

Equation *2.2* estimates the determinants of household net remittances. Net Remittances (*NR*) are the net sums sent to and from the household. Money brought/sent by household members is excluded. Hence, equation *2.2* incorporates permanent migrants and outmovers but leaves out temporary migrants.

$$NR_{ij} = \beta_0 + \beta_1 M^P_{ij} + \beta_{2*} M_{ij}^O + \beta_3 H_{ij} + \beta_4 R_{ij} + \varepsilon_{ij} \qquad (2.2)$$

Equation *2.3* estimates whether education affects household incomes earned through non-farm wage work (*NF*). Temporary migrants are included since they are still household members, whereas permanent migrants and outmovers are excluded.

$$NF_{ij} = \beta_0 + \beta_o ES_{ij} + \beta_1 EH_{ij} {}^+\beta_1 M^T_{ij} + \beta_3 H_{ij} + \beta_4 H_{ij} + \beta_5 R_{ij} + \varepsilon_{ij} \tag{2.3}$$

Equation *2.4* estimates whether education affects household farm income. Farm income is approximated with the per capita revenues that households receive from selling their main crops (e.g. rice, wheat).

$$CR_{ij} = \beta_o ES_{ij} + \beta_1 EH_{ij} + \beta_2 M_i^T + \beta_3 M_i^P + \beta_4 M_i^O + \beta_6 * H_{ij} + \beta_6 R_{ij} + \varepsilon_{ij} \tag{2.4}$$

If family members leave the household, this reduces the available labor for household activities, which potentially decreases crop revenues. Migration reduces the manpower available for household work. In particular, temporary migration may decrease the per capita crop revenues of households since temporary migrants are still household members. However, in rural China, labor is considered to be a surplus commodity in relation to scarce land (see e.g. Knight and Song, 2005, pp. 172.) and therefore the marginal productivity is assumed to be low. Losing manpower through migration may also, when necessary, be easily counteracted by recruiting labor from elsewhere. Out of 735 responding survey households, 116 hired farm labor. Since outmovers and permanent migrants, in contrast to temporary migrants, are no longer household members, it is possible that they positively affect crop revenues by helping out on the farm when they are visiting. Arguably, outmovers may help out more than permanent migrants since they live in the same village. Further, if education increases the farm productivity of household members, migration should have stronger negative effects the higher the level of education. This would then be indicative of a brain drain. How migration affects crop revenues is obviously hard to predict and equation *2.4* therefore includes all types of migrants.

For normal-distributed confidence intervals to be correct, the error term needs to be normally distributed. However, a Jarque-bera test rejects normality. Hence, the confidence intervals for

the parameter estimates in equations *2.1-2.4* are obtained through nonparametric bootstrapping[5].

Theories on migration provide valuable insights into reversed causalities, which may complicate the analysis. Household incomes are not only influenced by family members who have migrated in the past. Migration decisions may also be based on expectations about household income in the future, and this concern appears particularly relevant for temporary migrants. The New Economics of Labor Migration (NELM) suggests that (temporary) migration decisions are made by households and that they send migrants to reduce risks and to acquire capital for investments. The household and the migrant are posited to agree on an implicit contract, where the household provides the migrant with a safety net in case of unexpected events in exchange for remittances. Advocates of NELM argue that this causal theory may best explain temporary migration (see e.g. Lucas and Stark, 1988). It is normally maintained that successful migrants, who do not recognize the need for such a safety net have low motives to remit. If remittances occur out of altruism, they are likely to decrease over time. If, however, the migrant plans on returning, she may remit out of the desire to inherit the family land or to increase her social status in the home community. Further, rich households are more likely than poor households to afford migration. Migration is associated with costs (e.g. transport and search costs) and reduces family labor, potentially reducing household incomes at least temporarily until the migrant finds a job and starts to remit.

Reversed causalities imply that the error terms (ε) and the independent variables are correlated which leads to biased parameter (β) estimates (Friedman, 1957). This is referred to as endogeneity. Two-stage-least-squares corrects for this. Instrumental variables are used to predict temporary migration and the predictions replace the actual values in equations *2.1* and *2.3-2.4*. The number of temporary migrants with primary, secondary or high school education (Mij^T) sent by each household is modelled as a count regression functional form:

$$Mij^T = \exp(\beta_0 + \beta_1 X + \beta_2 I_{ij} + \varepsilon_i) \qquad\qquad (2.5)$$

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[5] For instructions on the procedures of bootstrapping, see e.g. Davidsson and McKinnon (2004) pp. 159-163

X_{ij} is the matrix of all exogenous explanatory variables used in equations 2.1-2.4 and I_{ij} is the external instrument and is a dummy variable that indicates if there was any migration from the village in 1988. This can serve as a proxy for migrant networks (see e.g DeBrauw *et al.*, 1999). The number of migrants is a non-negative integer and equation 2.5 is therefore estimated using poisson regressions.[6] After estimating equation 2.5, the predicted numbers of temporary migrants with a certain level of education are used to replace the actual ones in equations 2.1 to 2.4. The residual sum of squares is correctly calculated by summarizing all the squared residuals, which are then divided by the number of observations, as opposed to the number of observations minus the number of parameters normally used in OLS regressions (see e.g. Davidsson and McKinnon, 2004). This is accounted for by manually estimating equations 2.1-2.4 using Gauss software.

3.2 Variables

The variables of interest in equations *2.1-2.4* include the number of family members with secondary and high school education in each household and the number of household migrants with primary, secondary and high school education. Gender was controlled for using the share of male migrants sent from each household. It was, however, found insignificant in all regressions and was therefore tossed out again.

Other variables control for heterogeneity of the households in the sample. The household head's experience indicates human capital. Land per capita measures productive assets available to the household and is expected to be positively correlated with crop revenues and total incomes. It may also signal the need for remittances and non-farm incomes. Households that are able to cultivate large areas of land are less likely to depend on remittances and other forms of side incomes.

Socioeconomic characteristics are approximated with the number of people living in the household, the number of young dependents (children below 12 years of age) and the household share of males. A high share of young members is likely to decrease the capacity for productive work and hence increase the need for remittances compared to households with many adults. It is therefore expected to have a negative correlation with household

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[6] See Davidson and McKinnon (2004)

income and non-farm wages. Households are also less likely to depend on remittances if they are able to borrow money. A dummy variable indicating that the household borrowed money from a bank during 1994 controls for this. The value of durable goods in the households also approximates the need for remittances.

Regional characteristics may affect the chances of non-farm employment, dependence on remittances and profitability of farming. The number of shops in the home village is a proxy for the size of the private sector surrounding the households. The number of buses passing through the village every day serves as a measure of infrastructure quality. Total market size is indicated by total village population. A dichotomous variable indicates whether local authorities supply fertilizers to farmers in their village. This measures a certain dimension of local community development and is expected to be positively correlated with household incomes.

To further control for non-farm employment opportunities in the village, equation 2.4 includes the share of the village population employed in TVEs. Since TVEs have been the main opportunity for rural residents to generate non-farm income without migrating or starting their own business (see e.g. Knight and Song, 2005 pp. 32), the TVE-share signals alternative market opportunities and decreases the necessity to generate income from farm activities.

Table 2.1 Independent variables in the empirical analysis

Variables	Description
Migration	
Temporary Migrants	An individual living in the household but who spent 3 months or more away during 1994
Permanent Migrants	Children who left the village.
Outmovers	Children who left the household but still live in the village.
Household Assets	
Land per capita	Cultivated land divided by household size Missing values are replaced with the sample average.
No answer land[d]	Dummy indicating no data on land.
Durables Per Capita	Per Capita cash value of durable goods in the household
Socioeconomic Factors	
Household Size	Number of people living in the household.
Young dependents	Number of children below 12 years of age living in the household.
Household Share Males	Share of males in the household.
Bank Loan	Indicates that the household borrowed money from a bank during 1994.
Human Capital	
Head Experience	Age of head in household-no of schooling years of head-6
# Secondary School	No of persons with 7-9 years of education in the household. Temporary migrants are excluded.
# HH High School	No of persons with more than nine years of education in the household. Temporary migrants are excluded.
Village Characteristics	
Shops in village	The number of shops in the village.
Buses in Village	The number of buses passing through the village each day.
Railway in Village[d]	Indicates presence of railway in the village.
Village Population	The number of persons living in the village.
Fertilizer[d]	Indicates that the village supplies farmers with fertilizers.
TVE Village Labor(%)	The number of persons employed at village enterprises divided by the total village population.
Village Average Remittances	The village average of household net remittances.

Note: [d] indicates dichotomous variable equal to one if true and zero otherwise.

Five dichotomous variables (as there were six counties in the survey) are used to indicate county residence, which may capture other possible geographical and economic characteristics not specifically controlled for. Finally, remittances received and sent by each household may be dependent on norms and traditions in the local community. The village average of household net remittances controls for this.

4   Estimation Results

4.1   Summary Statistics

The dataset is a household survey covering 787 rural households from 31 villages and six counties in the Chinese provinces of Hebei and Liaoning. The households were interviewed in the summer of 1995 and a community survey collected information about the villages between July and August in 1997. Hebei and Liaoning provinces are both characterized by their costal location and their proximity to Beijing. Liaoning has received significant foreign direct investments since the late 1970s (He and Pooler, 2002). In 1994, Liaoning received foreign direct investment of 35 US$/capita, which was the sixth highest rate in China. Hebei received roughly 8 US$/capita.[7] Estimated migration rates based on census data from 1990-95 suggest a positive net inflow for Liaoning, while most immigrants originated from the nearby north-east provinces of Jilin, Heilongjiang and Inner Mongolia. In contrast, Hebei had a positive net outflow and is an important supplier of migrant labor for Beijing (see e.g. He and Pooler, 2002; Chan, Liu and Yang, 1999). The per capita income of China's 31 provinces ranged between 1553 RMB (Guizhou) and 15204 RMB (Shanghai) in 1994. With 3376 RMB Hebei fairly mimics the national average of 3834, whereas Liaoning as the sixth richest province is substantially wealthier.[8]

In terms of school enrolment rates, the Hebei and Lianoing provinces have seen similar changes to the national developments since 1995. Whereas per capita enrolment rates at the secondary level and higher levels have increased since 1995, they decreased at the primary level. The changes are relatively modest.[9]

The data is a living standards measurements survey from the World Bank and contains information on household characteristics, wealth, agricultural production and non-farm

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[7] Author's Calculations and National Bureau of Statistics of China, www.stats.gov.cn

[8] Author's Calculations and National Bureau of Statistics of China, www.stats.gov.cn. The official exchange rate in 1994 was 8.76 Yuan/US$ (International Financial Statistics). The gdp per capita of Lianong in 1994 was 6103 Yuan in current prices.

[9] In Hebei, per capita enrollment rates (%) at the primary, secondary and higher levels of education changed from 13.2, 4.8 and 0.2 to 6.7, 6.4 and 0.4. In Liaoning they changed from 9.2, 4.9 and 0.4 to 5.7, 5.2 and 1.8. At the national level they changed from 10.9, 4.4 and 0.2 to 8, 6.2 and 1.4 (China Statistical Yearbooks, 1996 and 2008 and authour's calculations).

activities in 1994. Almost all of the households performed farming activities. 343 of the 772 households analyzed in the empirical analysis reported at least one family member who had left the household. 224 and 141 households had at least one permanent and temporary migrant, respectively. Further, 141 households reported that at least one of their children had left the household but still lived in the village (outmovers). Table 2.2 reports average years of schooling for migrants and natives. Migrants have on average more education than natives. This may be indicative of two things: First, in 1994, skilled jobs may not have been available in the villages covered by the survey and therefore it might have been necessary to migrate to benefit from education. Second, the abilities of highly educated individuals, which are not necessarily related to their level of education[10], may be higher than for individuals with low education. Highly educated individuals may therefore be more prone to migrate to reap the benefits from their higher ability. Further, men have more education than women across all categories and the empirical analysis will therefore control for gender.

Table 2.2 Sample Average of Years of Education

Migrants/ Household Residents	Average Education (years)
Permanent Migrants	7.2(485)
Permanent Migrants -Men	8.2(151)
Permanent Migrants - Women	6.8(334)
Temporary Migrants	7.1(127)
Temporary Migrants - Men	7.4(84)
Temporary Migrants - Women	6.4(40)
Outmovers	6.6(295)
Outmovers - Men	6.7(220)
Outmovers -Women	6.2(75)
Household Members	5.7(1999)
Household Members - Men	6.3(998)
Household Members - Women	5(1001)

Source: Author's Calculations, the number of individuals are in parentheses.
Households residents below 18 years of age are excluded.

Tables 2.3 and 2.4 display self reported motives for migration. Whereas a substantial share of permanent migrants left their households to find work elsewhere (e.g. 23.5 percent of all permanent migrants with secondary education), almost all outmovers left because they got

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[10] As discussed previously, this is referred to as an ability bias (see e.g. Borjas, 2002).

married or to establish their own household. The tables show that education and moving due to work related reasons are more positively correlated for permanent migrants than for outmovers.

Table 2.3 Declared Reasons for migrating - Permanent Migrants (%)

	Primary School	Secondary School	High School	Male	Female
Marriage	72.2	60.8	37.5	2.0	89.5
Establish own household	10.5	10.8	9.7	32.2	0.9
Army	1.4	3.4	5.6	9.2	0.0
Work	14.4	23.5	45.8	53.3	9.0
Other	1.4	1.5	1.4	3.3	0.6
$\sum$	100	100	100	100	100
Number of Individuals	209	204	72	152	334

Source: Estimates of this paper and World Bank LSMS Survey

Table 2.4 Declared reasons for migrating - Outmovers (%)

	Primary School	Secondary School	High School	Male	Female
Marriage	23.1	22.6	27.3	1.4	87.8
Establish own household	75.6	75.7	72.7	97.3	10.8
Army	0.6	0.0	0.0	0.5	0.0
Work	0.6	1.7	0.0	0.9	1.4
Other	0.0	0.0	0.0	0.0	0.0
$\sum$	100	100	100	100	100
Number of Individuals	156	115	22	219	74

Source: Estimates of this paper and World Bank LSMS Survey

Table 2.5 further shows that permanent migrants with either secondary or high school education typically migrate longer distances than permanent migrants with primary education. Men migrate longer distances than women.

Table 2.5 Destination of Permanent Migrants (%)

Education and Gender	Destination			$\sum$	No. Of Individuals
	Other Province	Other County Within Province	Within County		
Primary School	8.5	16.9	74.6	100	201
Secondary School	14.5	18.8	66.7	100	186
High School	11.4	20.0	68.6	100	70
Male	24.6	22.5	52.9	100	138
Female	5.7	16.9	77.4	100	314

Source: Estimates of this paper and World Bank LSMS Survey

Although these facts suggest that education matters, specifically for permanent migrants, it is even more informative to look at occupational status. Tables 2.6-2.9 report the occupational status of migrants and natives. Permanent migrants and outmovers with primary education are more frequently engaged in agriculture than individuals with more education. Household members with more than primary education have been more successful in finding non-farm employment. These patterns are less pronounced for temporary migrants. Men typically have more diversified sources of income than women.

Table 2.6 Employment Status of Permanent Migrants (%)

	Primary School	Secondary School	High School	Male	Female
Agriculture	62.8	43.7	10.4	17.4	61.3
Industry	21.9	23.7	17.9	39.6	13.8
Geological Survey	0.0	2.6	0.0	1.3	1.0
Construction	1.5	5.8	0.0	4.0	2.6
Transportation and Communication	2.0	2.6	9.0	4.7	2.6
Commerce, Restaurant	3.1	6.8	4.5	8.1	3.3
Real estate	0.0	1.1	10.4	3.4	1.3
Health care	0.5	2.1	25.4	7.4	3.6
Education etc.	0.5	1.1	9.0	3.4	1.3
Scientific Research	0.5	0.0	1.5	1.3	0.0
Banking and Insurance	0.0	3.7	0.0	3.4	0.7
State and Local Government	5.1	3.2	4.5	0.0	6.2
Looking for job	1.0	1.1	3.0	0.0	2.0
Army	1.0	2.6	4.5	6.0	0.3
∑	100	100	100	100	100
Number of Individuals	196	190	67	149	305

Source: Estimates of this paper and World Bank LSMS Survey

Table 2.7 Employment Status of Outmovers (%)

	Primary Shool	Secondary School	High School	Male	Female
Agriculture	87.9	70.2	63.6	76.7	83.6
Industry	7.9	14.9	22.7	13.8	6.0
Construction	0.0	0.9	0.0	0.5	0.0
Transportation and Communication	0.0	0.9	0.0	0.5	0.0
Commerce, Restaurant	2.9	0.9	0.0	1.4	3.0
Real Estate	0.0	2.6	4.5	1.0	3.0
Health Care	0.0	0.9	4.5	0.5	1.5
Education etc.	0.7	0.0	4.5	0.5	1.5
Banking and Insurance	0.7	7.9	0.0	5.2	0.0
State and Local Government	0.0	0.9	0.0	0.0	1.5
∑	100	100	100	100	100
Number of Individuals	140	114	22	210	67

Source: Estimates of this paper and World Bank LSMS Survey

Table 2.8 Off-Farm Employment Status for Temporary Migrants (%)

	Primary School	Secondary School	High School	Male	Female
Unemployed/Working at Own Farm	26.8	5.8	38.5	7.6	48.1
Agriculture	9.8	5.8	7.7	7.6	7.4
Industry	14.6	26.9	15.4	24.1	11.1
Geological Survey	0.0	0.0	0.0	0.0	0.0
Construction	34.1	26.9	0.0	35.4	0.0
Transportation and Communication	2.4	7.7	15.4	8.9	0.0
Commerce and Restaurant	9.8	9.6	7.7	5.1	22.2
Real Estate	2.4	9.6	0.0	6.3	3.7
Health Care	0.0	1.9	0.0	0.0	3.7
Education etc.	0.0	0.0	7.7	1.3	0.0
Scientific Research	0.0	1.9	7.7	2.5	0.0
Banking and Insurance	0.0	1.9	0.0	0.0	3.7
State & Local Government	0.0	0.0	0.0	0.0	0.0
Other	0.0	1.9	0.0	1.3	0.0
$\sum$	100	100	100	100	100
No of Individuals	41	52	13	79	27

Source: Estimates of this paper and World Bank LSMS Survey

Table 2.9 Off-Farm Employment Status for Household Members (%)

	Primary School	Secondary School	High School	Male	Female
Unemployed/Working at Own Farm	66.2	38.4	27.8	36.9	71.9
Agriculture	8.4	11.4	7.4	11.2	7.5
Industry	7.6	17.6	14.8	15.4	7.6
Geological Survey	0.2	0.0	0.0	0.0	0.2
Construction	5.5	8.5	6.5	11.7	1.4
Transportation and Communication	1.6	5.6	2.8	5.4	0.8
Commerce and Restaurant	7.4	9.2	11.1	10.9	5.5
Real Estate	1.4	3.8	2.8	2.5	2.0
Health Care	0.2	1.6	4.6	0.8	1.0
Education etc.	0.1	0.6	13.0	1.1	0.8
Scientific Research	0.0	0.3	1.9	0.3	0.1
Banking and Insurance	0.3	0.4	1.9	0.5	0.3
State & Local Government	0.5	1.6	4.6	2.1	0.1
Other	0.8	1.0	0.9	1.1	0.6
$\sum$	100	100	100	100	100
No of Individuals	1169	693	108	989	983

Source: Estimates of this paper and World Bank LSMS Survey

4.2   Household Income

Table 2.10 reports the results from household income regressions. Overall, the instrumental variable approach performs well and the predicted values of migration are quite highly correlated with the actual number of migrants.[11]

The first regression does not consider the role of education and solely distinguishes temporary and permanent migrants and outmovers. The results suggest positive effects from permanent migration (0.03) whereas the estimated parameters for temporary migrants and outmovers are significantly negative (-0.23, -0.05)

As indicated in table 2.2, permanent migrants have on average more education than temporary migrants and outmovers, although the differences are low. The occupational status of permanent migrants, outmovers and temporary migrants, reported in tables 2.6-2.8, suggest that education yields higher chances of non-farm employment for permanent migrants and outmovers than for temporary migrants. Therefore, the results in table 2.10 (model one) may indicate that permanent migrants generally have more education. Temporary migration may involve different mechanisms. As temporary migrants are an integral part of household labor, migration is more likely to negatively affect household income via reduced crop revenues if there is a shortage of labor. Besides, the migration literature generally acknowledges that migrants are younger and healthier than those remaining behind, indicating that they are more productive than natives (see e.g. Stark and Bloom, 1985). This may negatively affect source community production.

Model two accounts for the migrants' level of education. The results suggest that the negative effect from temporary migration is driven by individuals with 7-9 nine years of education. In this case, migrants' remittances do not appear to be able to compensate for negative effects on farming. A negative effect is also found for outmovers with primary education, suggesting that they do not remit enough. Positive effects are estimated for permanent migrants with

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[11] The predicted number of temporary migrants and the actual number has a correlation of 0.37. The covariances between the predicted number of temporary migrants with primary, secondary and high school and the actual values are 0.48, 0.49 and 0.65, respectively.

secondary education and outmovers who have spent more than nine years in school. This suggests that migrants with higher education may be able to compensate for negative production effects from migration.

The strongest evidence that education does matter for people who have left is that household income is positively and significantly correlated with the number of permanent migrants with 7-9 years of education and with outmovers who have spent more than nine years in school. The results do not suggest that the estimated positive effect from education is contingent on migration. The number of household members (i.e. non-migrants) with secondary and high school education is positively and significantly correlated with household income, which suggests that education has positive effects independent of the decision to migrate.

The control variables have the expected signs when significant. Households with more land have higher incomes than households with less land. Increasing household size and the number of household residents below 12 years of age are (*Young Dependents*) negatively correlated with per capita income. Measures of village development and infrastructure are positively correlated with household income (*Buses in village, Shops in village*). Moreover, villages that supply fertilizers to farmers have significantly higher per capita incomes. *Head experience* has positive but diminishing effects on household incomes.

Table 2.10 The Effect of Education and Migration on Overall Household Income

Dependent Variable : Natural logarithm of Household Per Capita Income

Variables	Model One		Model Two	
	Coefficient	90 % C.I.	Coefficient	90 % C.I.
Constant	7.74***	[7.53, 7.95]	7.73***	[7.53, 7.93]
Household Size	-0.07***	[-0.1 , -0.04]	-0.06***	[-0.1, -0.03]
Young Dependents	-0.07***	[-0.12 , -0.03]	-0.06**	[-0.11, -0.02]
Share Male HH Members	0.02	[-0.14, 0.18]	0.03	[-0.12, 0.2]
Head Experience	0.09*	[0.015, 0.16]	0.07	[-0.002, 0.15]
Head Experience^2	-0.018***	[-0.02 , -0.009]	-0.02***	[-0.02, -0.007]
Land per Capita	0.013**	[0.003, 0.02]	0.012***	[0.003, 0.02]
No Answer Land	0.1*	[0.004, 0.19]	0.09*	[0.002, 0.19]
# HH Secondary School	0.1***	[0.07, 0.13]	0.1***	[0.06, 0.13]
# HH High School	0.12***	[0,06, 0.17]	0.11***	[0.05, 0.18]
Fertilizer	0.09*	[0.01, 0.15]	0.1**	[0.002, 0.17]
Shops In Village	0.002	[-0.0001, 0.005]	0.003*	[0.0001, 0.005]
Buses In Village	0.004***	[0.003, 0.005]	0.004***	[0.003, 0.005]
Village Population	0.03	[-0.04, 0.12]	0.03	[-0.05, 0.12]
# Temporary Migrants^{IV}	-0.23***	[-0.34, -0.1]		
# Temporary Migrants <7^{IV}			-0.14	[-0.37, 0.08]
# Temporary Migrants 7-9^{IV}			-0.27**	[-0.46, -0.08]
# Temporary Migrants >9^{IV}			-0.18	[-0.45, 0.09}
# Permanent Migrants	0.03*	[0.003, 0.06]		
# Permanent Migrants >7			-0.004	[-0.05, 0.04]
# Permanent Migrants 7-9			0.1***	[0.05, 0.14]
# Permanent Migrants >9			0.02	[-0.06, 0.09]
# Outmovers	-0.05**	[-0.08, -0.02]		
# Outmovers <7			-0.11***	[-0.16, -0.06]
# Outmovers 7-9			0.014	[-0.04, 0.07]
# Outmovers >9			0.17*	[0.02, 0.32]
Observations	772		772	
Adjusted R^2	0.314		0.36	

Source: Estimates of this paper and World Bank LSMS survey.***,**, and * denote statistical significance at 1, 5 and 10 percent levels, respectively. County fixed effects are not reported. Level of significance is obtained through non-parametric bootstrapping (see Davidson and Mckinnon, 2004). IV denotes that predicted values replace the actual ones.

4.3.   *Remittances and Non-Farm Incomes*

Table 2.11 reports the estimates from equation *2.2* of determinants of household net remittances. Net Remittances (*NR*) are the net sums sent to and from the households, excluding money brought/sent from household members (e.g. temporary migrants).

Permanent migrants and outmovers have positive coefficients indicating that they send more money to the household than they receive. The estimate for outmovers is not significant but skewed positive. The positive effect from permanent migration appears to be driven by the category of individuals with 7-9 years of schooling. This suggests that permanent migrants with secondary education can afford to remit more than permanent migrants with primary education. However, there is no evidence that permanent migrants with more than nine years of education remit larger amounts. For outmovers, the results do not suggest that their educational levels has an effect on the amount that they remit.

The motivation to remit is complex and hard to model, as is indicated by the relatively poor econometric fit and few significant parameter estimates. Families that devote many hours to non-farm work receive significantly smaller amounts of remittances, implying that these households have a lesser need for outside assistance than households relying heavily on farm work. Besides, the local availability of non-farm work signals a higher economic development level. Village norms and traditions (*Village Average Remittances*) appear to be of some importance for explaining household remittances.

Table 2.11 The effect of Education and Migration on Net Remittances

Dependent Variable: Household Per Capita Net Remittances

Variables	Model One		Model Two	
	Coefficients	90 % C.I.	Coefficients	90 % C.I.
Constant	148.8	[-35.6, 327.1]	138.5	[-37.2, 317.3]
Household Size	-20	[-54.4,16.6]	-16.9	[-50.7, 20]
Young Dependents	-20	[71.6, 28.5]	-8.9	[-59.9, 38.5]
# HH Secondary School	-19.8	[-53.1, 16]	-24.3	[-57.8, 11.3]
# HH High School	-43.6	[-122.4, 31.5]	-40.8	[-119.5, 34.1]
Land Per Capita	-8	[-20.3, 2.6]	-9.3	[-21.1, 1.6]
No Answer Land	147.8*	[16.2, 282.4]	139.5*	[9.2, 269.3]
Durables Per Capita	-0.007	[-0.03, 0.009]	-0.01	[-0.03, 0.004]
Non Farm Working Hours	-0.02**	[-0.04, -0.005]	0.02**	[-0.04, -0,007]
Village Population	-18.8	[-128.2, 82.9]	-17.8	[-118.8, 82]
Village Average Remittances	0.33***	[0.14, 0.5]	0.31***	[0.13, 0.48]
Shops in Village	-0.11	[-3.1, 2.45]	-0.18	[-3.03, 2.3]
Buses in Village	0.71	[-0.87, 2.16]	0.66	[-0.88, 2.06]
Bank Loan	14.1	[-62.3, 93.7]	4.4	[-69.9, 82]
# Permanent Migrants	53.1***	[27.9, 89.5]		
# Permanent Migrants <7			-23.7	[-70.7, 26.3]
# Permanent Migrants 7-9			175***	[123.1, 221.4]
# Permanent Migrants >9			-20.9	[-101.7, 64.5]
# Outmovers	39.5	[-7.4, 79.6]		
# Outmovers <7			58	[-8.6, 115.4]
# Outmovers 7-9			61.5	[-17.7, 128]
# Outmovers >9			-6.4	[-171.4, 160.8]
Observations	763		763	
Adjusted R^2	0.06		0.085	

Source: Estimates of this paper and World Bank LSMS survey.***,**, and * denote
statistical significance at 1, 5 and 10 percent level. County Fixed effects are not reported.
Level of significance is obtained through non-parametric bootstrapping
(see Davidson, McKinnon, 2004).

Table 2.12 reports the findings from equation 2.3, which estimates whether the level of education of family members and temporary migrants affects non-farm incomes. These only include incomes earned by people living in the households. Permanent migrants and outmovers live elsewhere and are therefore excluded.

The parameter estimate for temporary migrants is not significant but skewed positive, and there is no evidence that higher education significantly increases their income. The point estimate for temporary migrants with secondary education is lower than that for temporary migrants with primary education, which is significant at the five percent level. As mentioned in section two, rural-urban migrants often migrate temporarily and eventually return to the

countryside as they are not entitled to social benefits and are often urged to accept low-status jobs. With this in mind, the results are not surprising. The results rather suggest that well educated family members should stay in the household as the benefits of higher education are not higher for migrants. The number of household members with secondary education and high school is positively and significantly correlated with non-farm income and the effect is strongest for family members with more than nine years of schooling.

Table 2.12 The Effect of Education and Migration on Households' non-farm incomes

Dependent Variable: Household Per Capita Non-farm Incomes

Variables	Model One		Model Two	
	Coefficients	90 % C.I.	Coefficients	90 % C.I.
Constant	-343	[-82, 784.4]	343.2*	[24.2, 703.4}
Household Size	-100.5**	[-168.5, -32.3]	-114.2 ***	[-176, 46.4]
Young Dependents	-54.7	[-146.7, 34]	-46.4	[-133.7, 39.6]
Share Male HH Members	309.7	[-17.6, 649.6]	328.2	[-65.7, 736.2]
Head Experience	0.08	[-13.1, 16.6]	0.16	[-14.2, 12.4]
Head Experience^2	-0.02	[-0.23, 0.15]	-0.02	[-0.16, 0.15]
Land Per Capita	-23.9**	[-44.6, -6]	-22.8***	[-35.5, -5.79
No Answer Land	-112.5	[-321.5, 83.7]	-109.9	[-266.6, 123.1]
# HH Secondary School	160.4***	[132.4, 225.8]	169.4***	[98.3, 240]
# High School	261.3***	[132.4, 374.8]	302.9***	[193.5, 452.6]
Shops In Village	9.1***	[4.6, 13.6]	9.4***	[4.5, 15.4]
Railway In Village	341***	[172.9, 815.7]	338.1***	[110.6, 586.4]
Buses In Village	-0.2	[-3, 2.3]	-0.2	[-2.8, 2.7]
TVE Village Labor (%)	2847**	[609.7, 4963]	2972.7***	[897, 5192]
Village Population	8.3	[-160.1, 183.2]	-0.5	[-163.7, 167.1]
# Temporary Migrants^{IV}	167.5	[-131.8, 428.9]		
# Temporary Migrants <7^{IV}			334.8**	[53.6, 749.6]
# Temporary Migrants 7-9^{IV}			206.2	[-54.5, 572.8]
# Temporary Migrants >9^{IV}			-131.6	[-619.3, 568.1]
Observations	772		772	
Adjusted R^2	0.132		0.131	

Source: Estimates of this paper and World Bank LSMS survey.***,**, and * denote statistical significance at 1, 5 and 10 percent levels, respectively. County fixed effects are not reported. Levels of significance are obtained through non-parametric bootstrapping (see Davidsson and McKinnon, 2004). IV denotes that the predicted values replace the actual ones.

Other variables control for household needs and local opportunities for non-farm incomes. The negative sign of *Land per capita* signals that residents with access to large areas of land are less likely to depend on non-farm earnings. The number of shops in the village is positively correlated with non-farm income and is likely to increase chances of non-farm

employment. Similar arguments probably explain the positive and significant sign of the local labor share of TVEs. Large households have lower non-farm per capita income. Buses passing through the village and the presence of a railway should facilitate commuting to nearby areas. *Railway in Village* is positive and significant.

Overall, the results in this section are mainly in line with the results in table 2.10, since they suggest that there are no extra pay-offs to household income if highly educated household members become temporary migrants. Further, permanent migrants with 7-9 years of education appear to remit more than other permanent migrants, which strengthens the results in table 2.10. However, the results also suggest (although insignificant) that outmovers with a maximum of nine years of schooling remit more than outmovers with more than nine years of education. This contradicts the results in table 2.10, which suggest negative and positive income effects from outmovers with less than seven and more than nine years of schooling on total household income, respectively. This is hard to explain considering that the results do not indicate that outmovers significantly affect either remittances or crop revenues (this is discussed in the next section).

4.4   Crop Revenues

Table 2.13 reports the results from estimating equation 2.4 and is the last step of the empirical analysis of whether migration and education affect household crop revenues.

Temporary migration withdraws manpower from household activities, which may have a negative effect on crop revenues. Along this line of reasoning, permanent migrants and outmovers are less important as they are no longer a part of the household labor force. They may, however, help out with farm work when they are visiting. The results suggest negative effects from temporary migration. This seems to be driven by the category of temporary migrants with 7-9 years of education, which is consistent with the results reported in table 2.10, indicating a negative correlation between the number of temporary migrants with secondary education and household per capita income. However, there is no evidence of a similar effect for temporary migrants with more than nine years of education, which may be due to too few observations in the sample. Permanent migrants and outmovers have

insignificant effects on crop revenues and there is no indication that their levels of education matter.

Table 2.13 The Effect of Education and Migration on Crop Revenues

Independent Variable: Household Per Capita Crop Revenues

	Model One		Model Two	
	Coefficients	90 % C.I.	Coefficients	90 % C.I.
Constant	-81.2	[-493.3,347.5]	-151.1	[-579.7, 281.5]
Household Size	-6.1	[-67.9, 61.9]	-14.9	[-83.3, 58.4]
Young Dependents	29.7	[-39.5, 98.4]	51.8	[-21.3, 127.3]
Share Male HH Members	368.2*	[32.9, 714.4]	422.7**	[72.6, 785.3]
Head Experience	-134.2*	[-262.5, -15.9]	-157**	[-284.5, -39.7]
Head Experience^2	14.3*	[0.6, 30.7]	18.6**	[4.1, 35.3]
Land per Capita	230.4*	[157.5, 316.1]	230.9***	[156.2, 315.2]
No Answer Land	-708.7***	[-878.4, -468.6]	-696.9***	[-861.8, -463.8]
# HH Secondary School	73.7*	[2.3, 144.6]	122.9***	[29, 220.2]
# High School	76	[-3, 166]	51.6	[-47.3, 167.2]
Shops in Village	5.5***	[2.1, 9.5]	5.4***	[2, 9.5]
Buses in Village	3.2	[-1.4, 8.4]	3	[-1.5, 8.2]
Village Population	-334.4***	[-535.1, -125.9]	-343.4***	[-542.9, -135.5]
TVE Village Labor (%)	-1403.7	[-3137, 539.3]	-1439.4	[-3132, 469.6]
Fertilizer	530.3***	[304.4, 765.9]	511.6***	[285.7, 745.7]
# Temporary Migrants ^{IV}	-223.2**	[-369.5, -47.3]		
# Temporary Migrants >7 ^{IV}			230.3	[-55.3, 589.7]
# Temporary Migrants 7-9 ^{IV}			-657.7**	[-1064.1, -179.1]
# Temporary Migrants >9 ^{IV}			71.9	[-195, 376]
# Permanent Migrants	-34	[-81.4, 17.2]		
# Permanent Migrants >7			-48.1	[-95.3, 5.2]
# Permanent Migrants 7-9			-46.2	[-131.9, 53.5]
# Permanent Migrants >9			46.8	[-67.9, 194.2]
# Outmovers	27	[-31.6, 91.5]		
# Outmovers <7			-17.1	[-73.3, 54.4]
# Outmovers 7-9			109.9	[-14.3, 261.1]
# Outmovers >9			-47.3	[-202, 154.4]
Observations	729		729	
Adjusted R^2	0.458		0.46	

Source: Estimates of this paper and World Bank LSMS Survey. ***, ** and * denote significance at one, five and ten percent levels, respectively. County fixed effects are not reported. Confidence intervals are obtained through non-parametric bootstrapping (see Davidson and McKinnon, 2004). IV denotes that the predicted values replace the actual ones. White's standard errors correct for heteroskedasticity.

Remaining parameter estimates are, when significant, as expected. Land size increases crop revenues and farmers benefit if the village provides fertilizers. Increasing the share of men living in the households leads to higher crop revenues. To live in a large village and a village that employs a large share of its labor force in TVEs is negatively associated with crop

revenues, suggesting that households devote less hours to farm work if they have other options. *TVE Village Labor* is insignificant but skewed negative. Expanding local markets, as proxied by the number of shops in the village, are significantly and positively correlated with crop revenues.

5   Conclusion

A growing literature recognizes the increasing importance of education in rural China. Substantial drop-outs of pupils in these areas and evidence that rural residents doubt the benefits of education highlight the need for clarifying research on this topic. The aim of this paper is to contribute to the debate by investigating education effects on a variety of income attainment indicators. There is some indication that households benefit from investing in the education of children. Income and the amount of remittances received by households are positively and significantly correlated with the number of permanent migrants with secondary education (7-9 years), which is not the case for permanent migrants with only primary education (<7 years). There is also some, but weaker, evidence of educational effects among children who leave the households but remain within the village (outmovers). Household per capita income is significantly and positively correlated with the number of outmovers with more than nine years of education. However, there is no significant effect on remittances. Turning to the educational levels of non-migrants, there is strong evidence that households benefit from educating individuals that do not move. The number of household members with 7-9 and more than nine years of schooling is found to be positively and significantly correlated with aggregated household per capita income and non-farm wages. In both cases, the effect is found to be slightly stronger for household members with more than nine years of schooling. Although not significant, the positive parameter estimate for temporary migrants in table 2.12 (168.5) weakly supports the conjecture that temporary migrants contribute to the household income by bringing non-farm earnings to their families. However, there is no support for educational effects. As mentioned in section two, rural-urban migrants often migrate temporarily and eventually return to the countryside as they are not entitled to social benefits and higher status while residing in the cities. Hence, one would not expect education to be a critical factor for temporary migrants, which slightly contradicts the results of Knight and Song (2005) who find that education has small but significant effects on

wages. Further, temporary migration negatively affects crop revenues and has an overall negative effect on household per capita income. Temporary migration of household members means reduced availability of labor for household activities e.g. farming. This is likely to be increasingly the case in the near future as China's reserve army of migrant labor from rural areas is about to dry up (see e.g. Zhong, 2007).

To sum up, the results in this paper suggest that households in rural China do benefit from education although it is not clear whether higher levels of education beyond grade 9 yield additional economic pay-offs. The results further suggest that it is not necessary for households to send migrants to reap the benefits of education. In fact, the strongest and most consistent result in this paper is that the educational level of household members has positive effects on household incomes, particularly on wages earned from non-farm work. The only group for which there is no indication whatsoever for educational benefits is made up of temporary migrants. Although the few observations of temporary migrants in the sample limit the chance to obtain significant results, this finding is not particularly surprising given China's migration policy. Hence, households that are too poor to increase their household income by sending temporary migrants, are better off sending the household members with the least education. The results do not allow direct inferences about causal patterns, but the underlying reason may well be connected with China's split labor market and unequal treatment of different groups.

As the data used for this paper only represents the two provinces of Hebei and Liaoning, future research is needed to conduct similar studies on surveys covering all the geographical regions of China. It would be of relevance to study whether education has different effects across different geographical regions in China and to perform similar studies on more up-to-date data as the labor market in China is constantly changing and becoming more mature. It may well be that the benefits to migration are larger in China's less developed provinces.
A final caveat applies: The educational system in China faces additional challenges which that not brought up in this paper. While enrollment rates have increased at higher levels

since the early 1990s[12] there is unequal access to education across developed and less developed regions. For instance, there has been a shortage of high school teachers in rural areas (Liang, 2001). The rapid change into a more knowledge-based economy has not only resulted in nine years of compulsory schooling, but also in new curriculums (see e.g. Wang, 2005.) which, of course, are new challenges in themselves.

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[12] World Development Indicators, Gross enrollment rates for secondary and tertiary education increased from 49 to 76 and from 3 to 22 percent between 1991 and 2006, respectively.

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Appendix

Table 2.14 Covariance Matrix of independent variables used in the regressions

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1 Land per Capita	1.00														
2 Household Size	-0.14	1.00													
3 Fertilizer	0.23	-0.15	1.00												
4 Young Dependents	-0.15	0.52	-0.16	1.00											
5 No Answer Land	0.00	-0.01	0.10	-0.04	1.00										
6 Shops in Village	-0.06	0.04	-0.23	0.05	-0.05	1.00									
7 Buses in Village	0.12	0.00	0.31	-0.01	0.06	0.27	1.00								
8 Head Experience	-0.02	-0.04	0.03	-0.40	0.04	-0.05	-0.02	1.00							
9 Head Experience2	-0.03	-0.07	0.02	-0.37	0.06	-0.04	-0.01	0.96	1.00						
10 Village Population	0.10	-0.03	0.04	0.01	0.02	0.25	0.44	0.02	0.04	1.00					
11 TVE Village labor (%)	0.01	-0.04	0.13	-0.04	0.00	-0.10	0.18	-0.04	-0.05	-0.26	1.00				
12 Share Male HH Members	0.03	-0.09	-0.03	-0.18	-0.03	-0.07	-0.03	0.06	0.06	-0.01	0.07	1.00			
13 #Permanent Migrants	0.08	-0.22	-0.03	-0.35	0.00	-0.01	-0.06	0.59	0.60	0.04	-0.08	0.01	1.00		
14 #Permanent Migrants 1-6	0.04	-0.14	0.01	-0.22	-0.02	-0.03	-0.05	0.45	0.46	0.02	-0.04	-0.02	0.73	1.00	
15 #Permanent Migrants 7-9	0.09	-0.17	-0.03	-0.29	0.03	-0.01	-0.04	0.40	0.38	0.03	-0.06	0.03	0.69	0.12	1.00
16 #Permanent Migrants >9	0.00	-0.10	-0.05	-0.15	0.00	0.03	-0.03	0.29	0.30	0.03	-0.06	0.01	0.48	0.11	0.17
17 #Outmovers	0.00	-0.28	0.03	-0.36	0.06	0.03	0.03	0.48	0.48	0.04	0.01	0.01	0.35	0.35	0.19
18 #Outmovers<7	0.00	-0.21	0.05	-0.26	0.09	0.04	0.02	0.39	0.40	0.03	0.00	0.00	0.32	0.42	0.06
19 #Outmovers 7-9	0.01	-0.21	0.01	-0.29	0.01	-0.01	0.02	0.32	0.31	0.03	0.03	0.02	0.20	0.09	0.22
20 #Outmovers>9	-0.05	-0.10	-0.05	-0.13	-0.02	0.05	-0.01	0.18	0.19	0.00	-0.05	-0.02	0.14	0.05	0.11
21 # Temporary MigrantsIV	-0.14	0.25	0.04	-0.01	-0.05	-0.06	0.00	0.11	0.08	0.00	-0.09	-0.04	0.08	0.17	-0.02
22 # Temporary Migrants <7[IV]	-0.03	0.30	-0.16	0.05	-0.01	-0.05	-0.09	0.00	0.00	0.05	-0.17	0.10	-0.04	-0.11	0.05
23 # Temporary Migrants 7-9[IV]	-0.05	-0.02	-0.10	-0.04	0.03	0.02	-0.04	-0.05	-0.06	-0.04	0.02	0.09	-0.06	-0.06	-0.07
24 # Temporary Migrants >9[IV]	-0.12	0.35	-0.15	0.02	-0.02	-0.06	-0.09	0.03	0.01	0.02	-0.17	0.09	-0.02	-0.02	-0.01
25 # HH Secondary School	-0.02	0.33	-0.07	0.06	0.04	0.06	-0.02	-0.21	-0.22	-0.05	-0.03	-0.01	-0.18	-0.19	-0.05
26 # HH High School	-0.09	0.07	-0.13	0.01	0.00	0.06	-0.06	-0.06	-0.06	0.02	-0.06	0.02	-0.05	-0.09	-0.05
27 Non Farm Working Hours	-0.23	0.29	-0.14	-0.06	0.04	0.04	0.07	-0.01	-0.05	-0.07	0.09	0.02	-0.09	-0.12	-0.02
28 Village Average Remittances	-0.17	0.11	-0.25	0.11	-0.02	-0.07	-0.11	0.13	0.15	0.27	-0.24	-0.05	0.12	0.11	0.06
29 Durables Per Capita	0.03	-0.10	0.05	-0.03	0.12	0.08	0.12	-0.20	-0.18	0.05	0.03	0.01	-0.03	-0.12	0.11
30 Bank loan	0.11	-0.09	-0.07	-0.08	0.02	0.04	-0.14	-0.01	0.00	-0.06	-0.13	0.03	0.03	0.03	0.01
31 Railway in Village	0.00	0.03	-0.06	-0.07	-0.02	0.05	0.11	-0.01	-0.03	-0.15	-0.07	-0.04	-0.02	-0.02	0.00

Table 2.14 Continued

	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
16 #Permanent Migrants >9	1.00															
17 #Outmovers	0.10	1.00														
18 #Outmovers<7	0.07	0.80	1.00													
19 #Outmovers 7-9	0.04	0.72	0.20	1.00												
20 #Outmovers>9	0.16	0.33	0.04	0.20	1.00											
21 # Temporary MigrantsIV	-0.06	-0.01	0.05	-0.05	-0.07	1.00										
22 # Temporary Migrants <7[IV]	-0.01	-0.07	-0.11	0.01	-0.02	-0.01	1.00									
23 # Temporary Migrants 7-9[IV]	0.06	-0.07	-0.06	-0.06	-0.03	-0.06	-0.04	1.00								
24 # Temporary Migrants >9[IV]	-0.01	-0.09	-0.08	-0.04	-0.06	0.50	0.73	0.40	1.00							
25 # HH Secondary School	-0.10	-0.20	-0.22	-0.09	-0.01	-0.21	0.47	-0.02	0.23	1.00						
26 # HH High School	0.10	-0.09	-0.07	-0.05	-0.05	-0.10	-0.12	0.45	0.06	-0.17	1.00					
27 Non Farm Working Hours	-0.01	-0.06	-0.07	-0.02	-0.02	0.03	0.11	0.05	0.12	0.31	0.16	1.00				
28 Village Average Remittances	0.05	0.10	0.06	0.09	0.05	0.15	0.07	0.03	0.15	-0.10	0.08	0.00	1.00			
29 Durables Per Capita	-0.06	-0.10	-0.11	-0.06	0.01	-0.13	-0.02	-0.02	-0.09	0.17	0.03	0.10	-0.05	1.00		
30 Bank loan	0.01	0.02	0.06	-0.03	-0.02	-0.09	0.07	0.01	0.01	-0.03	-0.04	-0.14	0.06	-0.03	1.00	
31 Railway in Village	-0.03	-0.01	-0.05	0.02	0.04	-0.05	-0.14	-0.08	-0.17	0.02	0.03	0.23	-0.06	0.05	-0.11	1.00