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Migrant Opportunity and the Educational Attainment of Youth in Rural China

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Abstract

This paper investigates how reductions of barriers to migration affect the decision of middle school graduates to attend high school in rural China. Change in the cost of migration is identified using exogenous variation across counties in the timing of national identity card distribution, which made it easier for rural migrants to register as temporary residents in urban destinations. The analysis first shows that timing of identification card distribution is unrelated to local rainfall shocks affecting migration decisions, and that timing is not related to proxies reflecting time-varying changes in village policy or administrative capacity. The findings show a robust negative relationship between migrant opportunity and high school enrollment. The mechanisms behind the negative relationship are suggested by observed increases in subsequent local and migrant non-agricultural employment of high school age young adults as the size of the current village migrant network increases.

This paper—a product of the Human Development and Public Services Team, Development Research Group—is part of a larger effort in the department to study the effects of rural-urban migration on household outcomes and investment decisions in migrant sending communities. Policy Research Working Papers are also posted on the Web at http://econ.worldbank.org. The author may be contacted at jgiles@worldbank.org.

Migrant Opportunity and the Educational Attainment of Youth in Rural China*

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1 Introduction

Throughout the developing world, promoting higher levels of educational attainment and improving education quality figure prominently among priorities of policy makers. The focus on improving educational attainment is well-founded: a substantial body of research confirms the benefits of human capital accumulation for long-run economic growth, and emphasizes the contribution of educational attainment to higher wages and the improvement of other human development outcomes. However, when a family decides whether or not to enroll a child in school, the decision is influenced by its ability to cover education-related costs, the opportunity cost of attending school, and the expected private returns to investment in education. If new wage earning opportunities for unskilled labor can be found by migrating, opportunity costs may dominate the real or perceived returns to further schooling. Whereas new wage earning opportunities may lower poverty incidence and improve household welfare in the short term, in the longer term they may worsen distributional outcomes as families from poor areas choose employment over investment in education.[1]

The reduction in barriers to migration in China over the last 15 years and the consequent growth in cross-regional migration make China a compelling setting in which to study the educational investment decision. With migration, one might initially expect that inequality between individuals may start to decline over time as returns to labor are equalized across regions. Distinct and permanent differences in educational attainment associated with the location of one's birth, however, raise the prospect of permanent increases in inequality among individuals with different levels of education and residing within the same geographic locations. Recently, alarms have been sounded within both the research and policy communities over increasing income inequality within, as well as across, China's regions (World Bank, 2003). Specifically, there is concern that widening income disparities may lead to political pressures that threaten the long-run viability of China's economic reforms. Maintaining or even strengthening incentives for children from rural households to remain in school may be one means through which policy might encourage a reduction in longer term inequality.[2] To determine whether a policy intervention might be warranted, however, it is first important to understand how employment opportunities in distant off-farm labor markets affect educational investment decisions.

In this paper, we focus on identifying the net effect of the migrant labor market on the deci-

[1] Rosenzweig (2003) and Glewwe and Jacoby (1998) have both recently emphasized the trade off between the short-run benefits of wage employment to poor households, who potentially face credit constraints, and long-run benefits associated with educational investment.

[2] Evidence from studies of urban labor markets suggests that the returns to education increased sharply over the decade from 1990 to 2000, but that returns are also highly non-linear and that average returns may be driven by high returns to college education. Zhang et al (2005) reviews evidence of increases in the return to education over time, and Heckman and Li (2004) and Cai, Park and Zhao (2007) provide evidence of non-linearity in returns to education.

sions of families in rural China to enroll middle school graduates in high school. Whereas middle school completion is mandated by policy in China (Tsang, 1996), high school education is neither compulsory nor heavily subsidized.[3] High school tuitions can be a substantial share of household annual income, and credit constrained families may be unable to enroll children in school. Increasing wealth associated with migrant or other off-farm employment opportunities may ease credit constraints and lead to higher enrollment rates (Edmonds, 2004; Glewwe and Jacoby, 2004). In addition, if returns to high school education either locally (Foster and Rosenzweig, 1996) or in migrant destinations (Kochar, 2004) are increasing, one might expect to observe an increase in the probability that families will enroll children in high school.

While improved migrant opportunities may reduce the effect of credit constraints on high school enrollment, they also raise the net return to migrant employment and therefore the opportunity cost of remaining in school. In this paper, we find that a decline in the cost of participating in migrant employment leads to a decrease in the probability that children will attend high school in rural China. At the mean level of village participation in the migrant labor market, we find that the elasticity of high school enrollment with respect to the size of the migrant labor force is between -0.18 and -0.23, depending on econometric specification. This economically significant effect need not be the direct result of immediate participation of middle school graduates in the migrant labor market. As migration increases, the local working age population declines, which could lead to an increase in the relative return to unskilled labor locally. Alternatively, high school age children may wait to migrate until they have obtained information about employment prospects outside their home counties.

The paper makes a significant contribution to analyses of the effects of migration on source communities. One fundamental problem in this literature is that identifying migration in a clean and convincing way is quite difficult. In this paper, we develop an instrumental variables approach that may be useful for identifying the impact of migration on a range of outcomes in source communities in rural China. We use a reform in the residential registration system that made it easier for rural migrants with national identification cards (IDs) to live legally in cities after 1988. National IDs, which were first available to urban residents in 1984, were not available in all rural counties as of 1988. We show that the size of the village migrant population is a non-linear function of the time since residents of a county received IDs, though allow for the possibility that the timing of ID distribution may be related to fixed unobserved characteristics of villages. After controlling for fixed village effects, we identify the effect of migrant opportunity by exploiting differences in the timing of access to IDs and the non-linearity in the relationship between the size of the village migrant

[3] Although educational subsidies vary by region in China, tuitions are generally lower for compulsory (primary and middle school) education than for high school education (Tsang and Ding, 2005).

network and the time since IDs were distributed. To ensure that the timing of ID card distribution is plausibly exogenous to migration decisions, we show that the timing of ID card distribution is not related to exogenous rainfall shocks that affect earnings in the local economy and incentives to participate in the migrant labor market. We further show that the timing of ID distribution is not systematically related either to time-varying local policies, which could influence the desirability of high school enrollment or migration, or to time-varying proxies reflecting local administrative capacity, which could be related to village leader responsiveness to local demand for IDs.

After showing that migrant opportunity has a negative effect on high school enrollment, we examine whether migrant opportunity affects enrollment differently for different types of families. Migrant opportunity has a stronger negative effect on the high school enrollment of children from families in which parents are professionals or had significant off-farm work experience. Given that children from such families are more likely to attend high school, finding a stronger effect on this group provides evidence that we are not simply identifying the decisions of families unlikely to enroll children in high school.

Finally, we examine the channels through which the effect of migrant opportunity spreads. A larger migrant network outside villages implies a smaller local labor force. As the participation of village residents in the migrant labor market expands, the opportunity cost of high school may rise both because the net return from migrant employment is increasing and because depletion of the local labor market with migration leads to an increase in the relative returns to local employment. We find that as the size of the migrant labor force increases, the probability that high school age children find subsequent employment in either migrant or local off-farm activities also increases.

The paper proceeds as follows. In the next section, we provide background evidence on rural-urban migration in China and on the demographic and educational profile of rural migrants from other research and data sources. We next introduce the data sources that we will use for our analyses and provide descriptive evidence on cohort trends in educational attainment and age of first-time out-migrants. Section 3 briefly discusses theoretical background, and section 4 introduces our empirical strategy. In section 5, we present our results and robustness checks, and section 6 concludes.

2 Background

Rural-Urban Migration in China

During the 1990s, China's labor market changed dramatically as the volume of rural migrants moving to urban areas for employment grew rapidly. Estimates using the one percent sample from the 1990 and 2000 rounds of the Population Census and the 1995 one percent population survey suggest that the inter-county migrant population grew from just over 20 million in 1990 to 45 million in 1995 and 79 million by 2000 (Liang and Ma, 2004). Surveys conducted by the National Bureau of Statistics (NBS) and the Ministry of Agriculture include more detailed retrospective information on past short-term migration, and suggest even higher levels of labor migration than those reported in the census (Cai, Park and Zhao, 2007).

Employment referral through networks of earlier migrants is an important dimension of China's rural-urban migration experience. Rozelle et al (1999) emphasize that villages with more migrants in 1988 experienced more rapid migration growth by 1995. Zhao (2003) shows that the number of early migrants from a village is correlated with the probability that an individual without prior migration experience will choose to participate in the migrant labor market. Meng (2000) also suggests that variation in the size of migrant flows can be partially explained by the size of the existing migrant population in potential destinations.[4]

The experience of migrants living in urban areas confirms the importance of migrant networks in finding employment in urban areas (Table 1). In a survey of rural migrants conducted in five of China's largest cities in late 2001, more than half the rural migrants secured employment before their first migration experience, and over 90 percent moved to an urban area where they had an acquaintance from their home village.[5] Notably, before migrating over half of migrants surveyed had a member of their extended family living in the city, and over 65 percent knew hometown acquaintances other than a family member in the city.[6]

The Rural Educational System and the Age and Educational Attainment of Rural-Urban Migrants

Education became compulsory through middle school in rural China after passage of the Law on Compulsory Education in 1986 (Tsang, 1996). In practice, some rural areas took considerable time to meet this standard, and many rural areas still provide only five years of elementary

[4] Referral through one's social network is a common method of job search in both the developing and developed world. Carrington, Detragiache, and Vishnawath (1996) explicitly show that in a model of migration, moving costs can decline with the number of migrants over time, even if wage differentials narrow between source communities and destinations. Survey-based evidence suggests that roughly 50 percent of new jobs in the US are found through referrals facilitated by social networks (Montgomery, 1991). In a study of Mexican migrants in the US, Munshi (2003) shows that having more migrants from one's own village living in the same city increases the likelihood of employment.

[5] We use the migrant sub-sample of the China Urban Labor Survey (CULS), which was conducted in late 2001 by the Institute for Population and Labor Economics at the Chinese Academy of Social Sciences (CASS-IPLE) working in collaboration with local National Bureau of Statistics Survey Teams. Researchers from Michigan State University and the University of Michigan collaborated in funding, designing, implementing and monitoring the survey. Using the 2000 Population Census as a guide, neighborhoods were selected using a proportional population sampling procedure. Sample frames were then assembled from residents' committee records of migrant households, and public security bureau records of migrants living on construction sites. Very short-term migrants are unlikely to have made it into the sample frame.

[6] Categories of acquaintance type shown in Table 1 are not exclusive because many migrants were preceded to cities by both family members and other hometown acquaintances.

education instead of the mandated six years. Thus, children completing middle school in some rural areas complete eight years of formal schooling, while in other areas middle school graduates complete nine years. After middle school, children may sit for examinations to enter academic or vocational-technical high schools, but families of students who pass examinations are required to pay substantial tuition before they can enroll.

Prior research on rural-urban migrants has found a positive correlation between completed schooling and the ability to participate in migrant labor markets.[7] Much of this correlation, however, likely reflects the effect of increasing education from low levels to completion of compulsory middle school education. Indeed, a considerable body of descriptive evidence shows that most migrants have middle school education or less. Descriptive statistics on migrants in the China Urban Labor Survey (CULS) cities reinforce the idea that migrants do not require high school education to find employment in urban areas (Table 2, Panel A). Of the rural-urban migrants surveyed in the CULS, nearly 82 percent had a middle school education or less, with 33 percent failing to complete middle school. While migrants with a high school education may earn higher wages, it is clear that high school graduation is not necessary to find a job as a migrant. The CULS data are largely consistent with nationally representative statistics on educational attainment among migrants from the 2003 National Bureau of Statistics (NBS) rural household survey (Table 2, Panel B). Just over 85 percent of rural migrants nationally have a middle school education or less. Moreover, a much higher share of working-age adults who work in local non-agricultural activities in rural areas have a high school education (21 percent) than those engaged in migrant activities (14 percent). In contrast with rural residents, nearly all children born in urban areas complete high school education, and substantial share continue on to university or post-secondary vocational-technical training programs.

Evidence on Educational Attainment and Age of Migration from the RCRE Supplemental Survey

For our primary analysis, we use household and village surveys conducted in 52 villages of four provinces from August to October 2004 in collaboration with the Research Center for Rural Economy (RCRE) at the Ministry of Agriculture. All 3999 households in the 2003 wave of the RCRE panel for these four provinces were enumerated, allowing us to match villages and households from the 2004 supplemental survey with a historical panel of villages and households that RCRE surveyed annually from 1986 to 2003.[8] One unique feature of the supplemental survey is that it

[7]More generally, Yang (2004) finds a positive correlation between household educational attainment and returns earned in both goods and factor markets during economic transition.

[8]A detailed discussion of a larger nine-province sample from the RCRE panel dataset, including discussions of survey protocol, sampling, attrition, and comparisons with other data sources from rural China, can be found in the data appendix of Benjamin, Brandt and Giles (2005). This paper makes use of village and household data from the four provinces where the authors conducted follow-up household and village surveys, which are Shanxi, Jiangsu,

enumerated the educational attainment, birth year, current occupation, work and migration history, and residence location for all children and other current and former residents (including deceased former residents) of survey households. This survey design eliminates the selection bias that would occur if household survey data that only included current household residents were used to study educational attainment. One might yet be concerned that entire families may migrate to locations with better education, but both the residential registration system and the land tenure system, in which the risk of land expropriation is quite high when it is left unproductive, makes the migration of entire families a rare event.[9]

Figures 1 and 2 summarize trends in educational attainment by cohort for individuals born after 1940 and residing (or previously residing) in RCRE households. The RCRE supplemental survey data suggest that cohorts from RCRE villages have educational attainment levels consistent with those found in the 2000 Population Census.[10] Educational attainment rises steadily over time, and the average educational attainment of girls and boys converges by the 1975 birth cohort.

In the RCRE survey, summary statistics on the age of first migration are consistent with surveys of migrants in urban areas. Between 1987 and 2004 the number of migrants of all ages increased while the average age of first migration remained fairly constant at 20 years of age (Figure 3). Individuals over 30 or 35, however, might reasonably be considered outliers who keep the average age of migration constant when it would have otherwise declined due to increasing migration among teenagers. Figure 4 shows lowess estimates of the share of three teen cohorts engaged in temporary or long-term migrant employment outside of their home counties. While the share of 15 and 16 year old children in migrant employment is increasing, the rate of increase does not appear dramatic, and the level of migration is low enough that it would not necessarily require a decline in high school enrollment.[11] The shares of 17 and 18 year olds and 19 and 20 year olds working in migrant jobs increase at a much faster rate. Given that much migration occurs after employment has been secured through referral, it is possible that potential migrants wait for a short period after completion of middle school before departing to work in an urban area.

3 Theoretical Framework

Below we present a simple model to frame the potential effects of expanding migrant opportunity on the decision to enroll a child in high school. The model illustrates the relationship between the

Anhui and Henan.

[9] See Chan and Zhang (1999) for a discussion of evidence on migration and the residential registration system; and Benjamin and Brandt (2002) and Brandt, Rozelle and Turner (2004) for discussions of village leader motives for land reallocation.

[10] Hannum et al (2004) use the 2000 Population Census to dicsuss evidence on rural educational attainment.

[11] This also reflects the fact that many 15 year-olds and some 16 year-olds are still in middle school.

cost of participating in migrant labor markets, expected returns to high school attainment, and the opportunity cost of schooling, as credit constraints are eased. To simplify the model, we assume that each household has only one child and focus our discussion on the high school enrollment decision.[12]

Assume that in each period households may choose to invest in human capital, H_t, and physical capital, K_t, which can be used either in agriculture or non-agricultural self-employment. Human capital is accumulated when the child attends school for e_t share of his or her time during the year, with a cost of P_t^e for tuition, books, supplies, and other costs associated with schooling. The household accumulates human capital according to:

$$H_{t+1} = H_t + \psi_t G(e_t) \tag{1}$$

where G is a concave production function and ψ_t is a learning productivity parameter reflecting school quality, child ability and factors that affect the motivation and effort of the child.

Households earn income from some or all of the following activities: agricultural production, non-agricultural self-employment and employment in migrant labor markets. Household production activities may utilize physical capital and labor of both children and adults, $y_t^h = \theta_t F\left(K_t, L_t^{a1}, L_t^{c1}\right)$, where θ_t is a multiplicative productivity shock with a mean of one, K_t is the current stock of capital, and L_t^{a1} and L_t^{c1} are adult and child labor used in household production, respectively. Household income from the migrant labor market is $y_t^m = w(H_t^a, M_{jt})L_t^{a2} + w(H_t^c, M_{jt})L_t^{c2}$, where L_t^{a2} and L_t^{c2} are adult and child labor used in migrant employment, and $w(H_t^a, M_{jt})$ and $w(H_t^c, M_{jt})$ are prevailing wage rates in the migrant labor market for adults and older children, respectively. We treat wages in the migrant market as net returns to the household from migrant employment, which are a function of human capital, H_t^a and H_t^c, and the effect of the migrant network, M_{jt}, from village j on the cost of migrating.[13] We assume that as M_{jt} increases, the cost of migrating falls. The household will thus accumulate physical capital according to

$$K_{t+1} = K_t + \theta_t F\left(K_t, L_t^{a1}, L_t^{c1}\right) + w(H_t^a, M_{jt})L_t^{a2} + w(H_t^c, M_{jt})L_t^{c2} - c_t - P_t^e e_t \tag{2}$$

We further restrict $K_t, K_{t+1} \geq 0$, which amounts to a credit constraint that affects the ability of

[12] Predictions from the model do not depend on this simplifying assumption, and in some specifications of our empirical analysis we will control for whether an individual is the first born child or the first born male. Glewwe and Jacoby (2004) and Kochar (2004) both present models with these basic features. We follow Glewwe and Jacoby in our derivation but allow for the possibility of migrant wage employment where net returns in the migrant market are dependent on size of the village migrant network and accumulated human capital.

[13] The migrant network may influence net income from migration by both lowering the cost of migration and by facilitating matches to higher quality jobs. These effects will be observationally indistinguishable, as they both raise the net return to participating in the migrant labor market.

the household to borrow against future income for current expenditures on consumption, tuition and education related expenses.

At $t = 0$, the child becomes eligible for school, and is eligible until period $t = T - 1$. In period T and beyond, returns to educational investment are realized. We assume that if the child is employed in farm production or off-farm activities while school aged, he or she performs unskilled tasks for which human capital is unimportant. The utility of human and physical capital stocks accumulated by period T over the remaining life of the household can be written as a terminal value function, $\Phi(K_T, H_T)$, which represents the uncertain future utility of the household and incorporates expected consumption and financial benefits from educated children. Current utility is an additively separable concave function of consumption c_t, the leisure of adults and the child ($l_t^a = 1 - L_t^{a1} - L_t^{a2}$ and $l_t^c = 1 - L_t^{c1} - L_t^{c2}$, respectively) and the child's current school enrollment, e_t. The household's objective function is to maximize

$$E_0 \left[\sum_{t=0}^{T-1} \delta^t U(c_t, l_t^a, l_t^c, e_t) + \Phi(K_T, H_T) \right] \tag{3}$$

subject to equations (1) and (2) and the borrowing constraint, where δ^t is the subjective discount factor and E_0 is the expectations operator. Households are uncertain about future values of ψ_t, θ_t, $w(\cdot, \cdot)$, P_t^e, and Φ.

The first-order conditions for an interior solution are:

$$U_c(t) = \lambda_t \tag{4}$$

$$U_{l^a}(t) = \lambda_t \left(\theta_t F_{L_t^{a1}}(t) + w(H_t^a, M_{jt}) \right) \tag{5}$$

$$U_{l^c}(t) = \lambda_t \left(\theta_t F_{L_t^{c1}}(t) + w(H_t^c, M_{jt}) \right) \tag{6}$$

$$U_e(t) + \mu_t \psi_t G_e(t) = \lambda_t \left(\theta_t F_{L_t^{c1}}(t) + w(H_t^c, M_{jt}) - P_t^e \right) \tag{7}$$

where μ_t and λ_t are time-varying shadow values of human and physical capital that will be scaled by the discount factor, δ^t. Solving the system of equations yields a school enrollment demand function of the form:

$$E_t^* = E^* \left(\lambda_t, \mu_t, \psi_t, \theta_t F_{L_t^{c1}}(t), \theta_t F_{L_t^{a1}}(t), w(H_t^a, M_{jt}), w(H_t^c, M_{jt}), P_t^e \right) \tag{8}$$

Because preferences are additively separable, current period decisions depend on past decisions and expected future prices only through the shadow prices of human and physical capital, μ_t and λ_t. Further, after controlling for λ_t, the borrowing constraint will only influence intertemporal decisions through the intertemporal Euler equation and have no affect on intratemporal decisions.

Using equations (4)-(7), we can trace out the potential effect of an increase in the village migrant labor network, M_{jt}, on the high school enrollment decision. First, since off-farm income increases, the shadow price of physical assets, λ_t, will fall. The wealth effect eases credit constraints associated with paying high school tuition, and may facilitate school high school enrollment. Second, the shadow price of human capital, μ_t, will change. The shadow price, μ_t, reflects the expected "return to schooling," since the terminal condition requires that $\mu_T = \frac{\partial \Phi}{\partial H_T}$, and it can be shown that $\mu_t = \mu_T$. The actual functional form of the terminal condition will affect whether or not the return to schooling rises with human capital investment. If $\frac{\partial w}{\partial H_t^c} > 0$ and is of significant magnitude when children complete middle school, the expected return to schooling will be positive, also increasing the likelihood of high school enrollment.

The third and fourth effects of an increase in the village migrant network size operate through the shadow prices of adult and child time. Since w increases as M_{jt} increases, the net income potentially earned in the migrant market given the child's current stock of human capital also increases. Therefore the value of the child's time increases, decreasing the likelihood of continued school enrollment. An increase in M_{jt} similarly increases the value of parent time in the migrant labor market and has a cross-price effect in equation (8) that is difficult to sign. The net effect of migrant opportunity on high school enrollment is a combination of all four of these effects and cannot be signed *a priori*.[14]

We simplify the enrollment demand function by recognizing that farm productivity will be a function of time varying household endowments and other characteristics, $\mathbf{X}_{ht}$, that affect wealth and family preferences for education. Among these characteristics are parent human capital, which also affects the returns that parents may earn both in the labor market and through household activities. The enrollment demand function can then be written as:

$$E_t^* = E^* \left(\lambda_t, \mu_t, \psi_t, \theta_t, \mathbf{X}_{ht}, M_{jt}, P_t^e \right) \tag{9}$$

where enrollment demand is now a function of the shadow price of physical capital, the expected return or shadow price of schooling, child ability, productivity shocks, household endowments and characteristics, migrant opportunity as proxied by the size of the village migrant labor force, and the tuition and other costs associated with high school enrollment.

[14]In our empirical analyses below, we do not attempt to identify these four effects individually. Rather, we aim to estimate the net effect of migration on the high school enrollment decision.

4 Empirical Methodology

To understand how migrant opportunity affects the decision to enroll middle school graduates in high school, we need to control for such factors as lifetime wealth, preferences, prices and unobserved ability that might covary with the probability of school enrollment and off-farm opportunities. From arguments of the enrollment demand function in equation (9), a reduced form model of the discrete decision of household h to enroll child i in high school can be written:

$$E_{it} = \beta_0 + \beta_1 M_{jt} + \mathbf{Z}'_{jt}\beta_2 + \mathbf{X}'_{ht}\beta_3 + \mathbf{u}_j + \mathbf{p} \cdot \mathbf{T}_t + \nu_i + e_{ihjt} \tag{10}$$

where E_{it} is 1 if an individual completing middle school in year t enrolls in high school in year $t+1$, and 0 otherwise. M_{jt} is the number of village residents with employment as migrants outside the home county, and proxies for the scale of migration from the village and the cost of finding employment in the migrant labor market.[15] $\mathbf{Z}_{jt}$ are other time-varying characteristics of the village that potentially affect local returns to high school education and alternative activities (the shadow value of schooling, μ_t, in equation (9)), and local factors influencing credit constraints faced by all households. Household characteristics, $\mathbf{X}_{ht}$, are introduced in some models to control for family preferences for education, factors affecting lifetime household wealth, and the likelihood that the household faces credit constraints. We include $\mathbf{u}_j$, a vector of village fixed effects, in all models because important village characteristics, like location, do not vary over time but influence both labor market returns and the cost of obtaining education. Price levels, macroeconomic shocks and trends may also affect family income, the cost of education, and the demand for migrant labor, and we control for these effects using province-year dummy variables, $\mathbf{p} \cdot \mathbf{T}_t$. The ability of individual middle school graduates, ν_i, is unobserved but important for high school enrollment decisions, and reflects the education productivity parameter, ψ_t, in equation (9). In particular, students must test into high schools and it is likely that examinations are more competitive where the local supply of spaces in high school is more constrained. In models that include household information, we include the parents' years of schooling to proxy for dimensions of family level ability, although other dimensions will remain unobserved. In order to identify the effect of migrant opportunity on enrollment decisions, instruments for the size of the migrant labor force must be plausibly unrelated to unobserved individual ability.

Since E_{it} is a binary variable, one might consider using a non-linear model such as a probit

[15] One might alternatively use the share of the village population working as migrants outside the village. In response to comments of an earlier referee and suggestions from seminar discussions, we have chosen to use the size of the migrant labor force in the presentation that follows. There are no qualitative changes to any results presented in the paper if we instead use the share of the village labor force working as migrants as the proxy variable.

to estimate equation (10). However, we must account for the endogeneity of migrant labor force, M_{jt}, and implementing an "instrumental variables" probit estimator requires placing restrictive normality assumptions on the error term. We work with the linear probability model because it allows us to implement a linear instrumental variables estimator, and the mean conditional probability that a middle school graduate will enroll in high school is close to 0.5. In this situation the estimated marginal effects are unlikely to differ significantly from those calculated from a probit.[16]

Our estimates of equation (10) use an instrumental variables, generalized method of moments (IV-GMM) estimator. The IV-GMM estimator we use incorporates a weighting matrix that accounts for arbitrary forms of heteroskedasticity and intra-cluster correlation of the error term, but assumes that errors are independent across clusters (Wooldridge 2002; Baum, Schaffer and Stillman 2003). This is the asymptotically efficient estimator in the presence of heteroskedasticity and intra-cluster correlation.[17]

Identification Strategy

Estimating equation (10) using OLS would introduce endogeneity bias because our proxy for the cost of migration, the size of the migrant labor force, reflects factors that influence both the demand for and supply of migrants from the village. A persistent disruption to the local economy, for example, could limit the ability of parents to cover tuition costs while raising the relative return to migrant employment in more distant destinations, inducing a negative relationship. On the other hand, positive correlation between the number of migrants from the village and unobservables affecting high school enrollment could exist if increases in household wealth or expanded high school capacity (and lower test scores for competitive admission) occurred simultaneously with growing access to migrant employment. To identify the effect of the migrant network and the higher net return from migration that comes with referral, we must find an instrumental variable that is correlated with the number of migrants living outside the village but unrelated to unobserved individual, household and community factors affecting high school enrollment.

We make use of two policy changes that, working together, affect the strength of migrant networks outside home counties but are plausibly unrelated to the demand for and supply of schooling. First, a new national ID card (*shenfen zheng*) was introduced in 1984. While urban residents received IDs in 1984, residents of most rural counties did not receive them immediately.

[16] Nonetheless, we estimated equation (10) using an instrumental variables probit model (Rivers and Vuong, 1988), and the signs and statistical significance of the estimated marginal effects are consistent with the coefficients on linear probability models that we present here.

[17] Kedzi (2003) emphasizes the importance of calculating standard errors robust to serial correlation of errors in fixed effects models. Bertrand, Duflo and Mullainathan (2004) show that failure to consider serial correlation in differences-in-differences analyses may lead to estimates of standard errors that are too small.

In 1988, a reform of the residential registration system made it easier for migrants to gain legal temporary residence in cities, but a national ID card was necessary to obtain a temporary residence permit (*zanzu zheng*) (Mallee, 1995).[18] While some rural counties made national IDs available to rural residents as early as 1984, others distributed them in 1988, and still others did not issue IDs until several years later. The RCRE follow-up survey asked local officials when IDs had actually been issued to rural residents of the county. In our sample, about half of the counties issued cards in 1988 (25 of 52), but cards were issued as early as 1984 in one county and as late as 1996 in another. It should be noted that IDs were not necessary for migration, and large numbers of migrants live in cities without legal temporary residence cards. However, migrants with temporary residence cards have a more secure position in the destination community, hold better jobs, and would thus plausibly make up part of a longer-term migrant network in migrant destinations. Thus, ID distribution had two effects after the 1988 residential registration (*hukou*) reform. First, the costs of migrating to a city should fall after IDs became available. Second, if the quality of the migrant network improves with the years since IDs are available, then the costs of finding migrant employment should continue to fall over time.[19] As a result, the size of the migrant network should be a function of both whether or not cards have been issued and the time since cards have been issued in the village. Given that the size of the potential network has an upper bound, we expect the years-since-IDs-issued to have a non-linear relationship with the size of the migrant labor force. We specify our instrument as a dummy variable indicating that IDs had been issued interacted with the years since they had been issued, and then experiment with quadratic, cubic and quartic functions of years-since-IDs-issued. We settle on the quartic function for our instruments because we find it fits the pattern of expanding migrant networks better than the quadratic or the cubic functions.

Though these policy changes are plausibly exogenous to schooling decisions, using a function of the years since IDs were issued as instruments is not an ideal identification strategy. Ideally, a policy would exist that was randomly implemented across space, affecting the ability to migrate from some counties but not others. As the differential timing of the distribution of IDs was not necessarily random, we must be concerned that counties with specific characteristics or that followed specific policies were singled out to receive IDs earlier than other counties, or that features of counties receiving IDs earlier are systematically correlated with trends in educational attainment.[20] These

[18] Legal temporary residence status does not confer access to the same set of benefits (e.g., subsidized education, health care, and housing) associated with permanent registration as an urban resident.

[19] Our identification strategy makes no attempt to explicitly identify the direct effect of the migrant network, as in Munshi (2003). Our purpose in using a function of years-since-IDs-issued is to identify the net effect of migration under the plausible assumption that networks of earlier migrants with legal residence may contribute to reducing the cost of migration.

[20] Introduction of the new ID card was coordinated by provincial offices of the Ministry of Civil Affairs.

counties, one might argue, were "allowed" to build up migrant networks faster than others.

To assess the possibility of endogenous placement bias in the distribution of IDs, to control for this endogeneity, and then to determine the likelihood that our results are biased by endogenous placement, we proceed as follows. First, we split the sample into early, middle and late adopters and examine lowess plots and average characteristics across groups to identify obvious evidence of bias. We determine that in estimation it is important to include village fixed effects to control for unobserved, time-invariant village characteristics that could lead to endogenous placement. Next we present evidence suggesting that IDs were not distributed in response to exogenous shocks to the local economy which might otherwise create incentives for migration. We further examine the viability of the instrument in section 5 below after examining the fit of alternative first-stage specifications. Specifically, we will look for evidence of correlation between the timing of ID distribution and time-varying village level proxies for both land and grain quota policies and the administrative capacity of the village government. We find no evidence to suggest a significant relationship between the timing of ID distribution and changes in village policies that could affect migration or enrollment decisions. After estimating the effect of migration on high school enrollment, we further check whether our results are robust to including additional time-varying village variables that proxy for unobservables potentially related to the timing of ID card distribution. In the remainder of this section, we present descriptive evidence on the timing of ID distribution.

Differences Across Villages and the Years-Since-ID Instrument

To evaluate the plausibility of using years-since-ID-distribution as an instrument, we first categorize villages as receiving cards prior to 1988, in 1988, or after 1988, and look for significant differences in observable average village characteristics measured in 1988 (Table 3). Some differences appear between early and late villages, but few are statistically significant. For example, although early adopters were more likely to be near cities, they were not all near cities. The only difference that approached statistical significance was between mean income per capita in villages receiving IDs before 1988 and other villages. Nonetheless, we control for these and other unobserved differences across villages by including village fixed effects in all models.

Even if villages that issued IDs early are not observably different from other villages, one should be concerned that the timing of ID card receipt was endogenous. Specifically, local interest in participating in the migrant labor market may have led county officials to issue IDs in response to a sharp rise in migration from villages. If true, issuing IDs would have little to do with new migration, but might be correlated with existing migrant flows. To consider whether demand for migration drove distribution of IDs, we plot the log number of migrants in the village workforce against the years since IDs were issued (Figure 5). The lowess plot through the data indicates that migration appears to rise immediately after or as IDs are issued, accelerates, and then slows to a plateau about 10 years later.[21] The pattern confirms that the relationship between the size of the village migrant outflow and the years since ID cards were issued is non-linear.

The observed lowess plots do not rule out the possibility that distribution of IDs was driven by demand for migration that arose either in the same year or in the year or two preceding ID distribution. To directly address this possibility, we estimated hazard models for ID distribution. The dependent variable takes a zero before IDs are issued and one in the year of issue, after which the village drops from the data set. The variable is then regressed on dummy variables for province and year, and rainfall shocks. Rainfall shocks affect local agricultural productivity and returns to labor in both the local agricultural and non-agricultural sectors. When large negative shocks occur, incentives to migrate increase and families may potentially pressure village or county leaders to distribute IDs. In successive models shown in Appendix A.3, we used the one year lag and the two year lag of the squared village July-November rainfall shock, and the combination of the two lags, to assess whether an important push factor influencing migration affects the demand for IDs.[22] Not only do we find no significant relationship between the rainfall shocks and the distribution of IDs, point estimates for the marginal effects are also quite small. The combination of these factors make us more confident that the incentives to migrate did not drive the timing of ID card distribution.[23]

Finally, our instruments could be correlated with differing trends in high school enrollment prior to ID distribution. To examine this possibility, we plot the share of individuals entering high school who are of age to do so by birth year cohort and by the timing of ID card distribution in the county (Figure 6). In general, there are no significant differences in trends prior to the 1973 birth cohort, whose parents would have been making the high school enrollment decision around 1988. We plot the same figure conditional on middle school completion (Figure 7), and again find no apparent differences in trends prior to the 1973 birth cohort. Note, however, that in villages receiving IDs after 1988, enrollment growth in high school was faster for birth cohorts after 1973 than in those villages with IDs by 1988. Considering the long-term income growth in rural China, this pattern is consistent with a dominant positive wealth effect in villages from which the cost of finding off-farm migrant employment is higher. Indeed, the effect of migrant opportunity on high school enrollment decisions is reflected in the differences in the trends of enrollment rates across villages that were

[21] To ensure that this pattern was not driven by the twenty-five counties receiving IDs in 1988, we plotted the figure with these villages removed and observed no difference in the relationship between years-since-IDs and migration.

[22] Giles and Yoo (2007) analyze the crop calendar and different combinations of monthly rainfall shocks, and demonstrate that for these villages and households the squared July-November rainfall shock is the strongest predictor of a poor winter wheat harvest in the following year, and has a negative impact on agricultural production. They also show that the lagged July-November rainfall shock is strongly related to increased participation in migrant labor markets, increased number of days in migrant employment and increased migrant remittances.

[23] When we included both shock variables in the same model, the χ^2 statistic jointly testing the null hypothesis that coefficients on the shocks are both zero was 0.72 with a p-value of 0.698.

early and late recipients of ID cards.

The Timing of the High School Enrollment Decision

In order to estimate equation (10), we must make two final assumptions about the timing of school enrollment and years of primary school. Although the RCRE supplementary survey provides us with an individual's age and years of schooling completed by 2004, we do not know the precise age at which each individual started school. To inform our assumption about the age at which children enter school, we use a survey conducted by the Center for Chinese Agricultural Policy (CCAP) in late 2000.[24] In addition to explicit questions about educational attainment, the CCAP survey asked specifically about the age at which individuals entered and left school. We find that among individuals aged 16 to 34, a slight majority of children began school at age 7 (Table 4). Therefore we assume that individuals begin school at age 7, and test whether our results are robust to this assumption.[25]

Our final assumption relates to the length of primary school. In some parts of rural China, primary school lasts five years, whereas in other places primary school lasts six years. The RCRE supplemental survey did not directly ask whether villages have five or six year primary schools. However, when we examine completed years of schooling at the village level, it is fairly straightforward to discern whether completed schooling patterns are consistent with five or six year primary schools. We found that in some villages most children completed 6, 9 or 12 years of school; as middle and high school each last three years, and these patterns were consistent with six year primary schools. In other villages, most children completed 5, 8, or 11 years of schooling, consistent with five year primary schools.[26] Using this information, we coded all of the villages as five or six year primary school villages. To illustrate our assumption, we show average enrollment rates for each grade level in five and six year primary school villages conditional on completing the previous grade (Table 5). Until the decision to enter grade 9 or grade 10, well over 90% of children continue schooling. The first significant decision node is clearly either the decision to move from grade 8 to grade 9 (in five year villages) or from grade 9 to grade 10 (in six year villages). We measure the decision to enroll in high school with a variable that includes the decision to enter grade 10 conditional on completing grade 9 for six year primary school villages and the decision to enter grade 9 conditional on completing grade 8 for five year primary school villages.[27]

[24] See de Brauw et al (2002) for a description of the CCAP survey.

[25] We tested whether our main results are robust to this assumption by assuming that children enter school at either age 6 or age 8, and found that the signs and relative magnitudes of our main results did not change.

[26] In the one village in which our method was indeterminate, we assume that the village has a five year primary school. Our results are robust to recoding the village as one with a six year primary school.

[27] All of our estimation results are robust to studying the grade 9 enrollment decision conditional on grade 8 completion, as well as to analyzing the grade 10 enrollment decision conditional on grade 8 completion.

A final concern involves handling repeated years of schooling or skipped grades. Although the supplemental survey did not ask explicitly about repeats or skips, the protocol for the supplemental survey required respondents to report years of schooling completed and the common interpretation is to answer in terms of the level of schooling completed. Examination of the CCAP data, which asked explicitly about skips and repeats, suggests their inclusion does not affect the general distribution of educational attainment. Therefore our findings should be robust to any errors in the measurement of schooling attainment.

5 Results

The First-Stage

Before estimating equation (10), we first establish that our instruments, a polynomial function of the years since ID cards were issued in the county interacted with a dummy variable indicating that cards had been issued, are significantly related to size of the migrant labor force. We first estimate the relationship as a quadratic, cubic, and quartic function of the years since IDs were issued (Table 6, columns 1a through 1c) with only province-year and village dummies as additional controls. Even after controlling for economic growth and macroeconomic shocks, we find a strong relationship between years-since-IDs were distributed and the size of the migrant network, regardless of specification. We favor the quartic function for the remainder of our estimation for two reasons. First, it allows for the most flexibility in determining the effects of ID card distribution on the migrant network.[28] Second, the partial R^2 increases significantly from the quadratic to the quartic, which reduces the potential for bias in instrumental variables regression.[29]

In the remainder of the models shown, we control for several village economic conditions that vary over time and may be related to both migration and school enrollment decisions. The vector $\mathbf{Z}_{vt}$ in models 2 through 5 includes indicators controlling for wealth, the local agricultural environment, potential credit constraints and size of the local labor market. To control for the average village wealth level, we include the logarithm of average income per capita. To control for opportunity costs in agriculture, we include the average land per capita and the share of land in the village that is cultivable. The cultivable land Gini coefficient controls for underlying inequality in the village and may affect credit constraints in the informal credit market.[30] Alternatively, a time-varying measure

[28] The quartic was first favored in studies of empirical age earnings profiles as far less restrictive than the typical second order polynomial in age (Murphy and Welch, 1990).

[29] Since the bias in instrumental variables estimation is inversely proportional to the partial R^2, a higher partial R^2 also implies lower bias so long as each additional instrument is strongly correlated with the endogenous variable. We also experimented with using a more flexible form comprised of dummy variables for each year since ids were available. We obtained qualitatively similar results but the power of the first-stage is much weaker.

[30] Under some assumptions, a higher Gini coefficient would be correlated with more severe constraints on access to

of within village inequality may pick up differences in changes across villages in the willingness to provide local public goods, like an elementary school, that are also correlated with likelihood of testing into high school. Finally, to control for the size of local labor markets, we include the size of the village labor force.

Because we are concerned about introducing unobservable heterogeneity into our models from individual or household level variables in our second stage, we next include only the village level controls in the first stage (Table 6, column 2). The instruments again have a jointly significant effect on the number of migrants from the village; in this case, the F-statistic is 16.27. As we add the individual and household level controls (models 3 through 5), the instruments remain jointly significant, with F-statistics that range between 15.85 and 15.98.

The Timing of ID Distribution and Village-Level Policy and Administrative Capacity

While Table 6 suggests that the timing of ID distribution may be systematically related to the size of the village migrant labor force, one might be concerned that the quartic in years-since IDs were distributed in the county may be systematically related to other time-varying village level policies or administrative capabilities. In turn, these policies may affect both migration or high school enrollment decisions. For example, village leaders have considerable control over implementation of grain procurement policy and land use by village residents, and so it is of interest to know whether decisions regarding grain procurement policy or land use are systematically related to the timing of ID distribution. If a systematic relationship exists, we might be concerned that the instruments proxy for factors other than migrant opportunity that influence the high school enrollment decision. Moreover, even though IDs became available at the county level and each county typically includes hundreds of villages, one might still be concerned that village administrative capacity is systematically related to timing of ID distribution within the county.

We construct proxies to control for the effects of time-varying village policy and administrative capacity, VP_{jt}, and regress all of them on the quartic in years since IDs, village fixed effects, and province-year effects:

$$VP_{jt} = \alpha_1 ID_{jt} + \alpha_2 ID_{jt}^2 + \alpha_3 ID_{jt}^3 + \alpha_4 ID_{jt}^4 + \mathbf{Z}'_{jt}\alpha_5 + \mathbf{X}'_{ht}\alpha_6 + \mathbf{V}_j + \mathbf{p} \cdot \mathbf{T}_t + e_{ihjt} \qquad (11)$$

In Table 7, we report F-tests on the quartic in years-since IDs were issued in specifications that both exclude (column 1) and include the vectors of household and village level characteristics (column

credit. Banerjee and Newman (1993), for example, provide a model suggesting that underlying wealth distribution and the nature of credit constraints may have an impact on occupational choice.

2). Initially, we examine local implementation of the grain quota policy. The grain quota was effectively a tax in which farm households were forced to provide some grain to the government at below market price.[31] The quota also constrained the decisions of households in those villages in which households are unable to provide cash or purchased grain in lieu of grain that the family had produced. When the quota share of grain produced is closer to one, quota policy is more likely to be driving the decision to continue growing grain crops. In rows 1 and 2, we observe that the quota share of grain produced has no systematic relationship with the years-since-IDs were issued.

We next test whether three indicators related to village land tenure security and land use are related to ID card distribution. While farmers nominally had fifteen and then thirty year leases on their land over the 1986 to 2003 period, the leases were treated as policy and it was not uncommon for village leaders to reallocate land much more frequently.[32] The share of land in the village planted in orchard crops, and the share of households renting land in and out are all indicators that reflect household perceptions of long-term land tenure security. Throughout the survey region, orchard crops are typically of higher value and far more labor-intensive in production than land-intensive grain crops. Planting orchard crops, however, requires a specific long-term investment that households may be unwilling to make when land tenure is insecure. Further, the transfer of land through rental arrangements will not occur in areas where a rental transaction is taken as a signal that a household no longer needs its land, and may thus lead to subsequent expropriation, or where villages place excessive administrative procedures and conditions on rental transfers. We observe no statistically significant relationship between share of land cultivated in orchard crops or share of households engaged in rental contracts and the timing of ID distribution in the counties where villages are located.

Finally, we examine the relationship between the weighted average local tax rate paid by households and timing of ID distribution (Table 7, row 6). During the study period, villages charged a range of different administrative fees to support investment in local public goods and to cover any village administrative costs. The weighted average village tax rate is a useful indicator of the administrative capacity of the village. If village administrative capacity is related to timing of ID distribution, because more capable village leaders are better at lobbying higher levels of government for IDs, then this capacity may also affect motives for migration and high school enrollment. We find no significant relationship between the time-varying weighted average village tax rate and the

[31] In the surveyed villages, as well as throughout rural China, the quota was phased out between 2001 and 2004.

[32] Local variation in land policy and in land tenure security in rural China has been documented by numerous scholars. A helpful selection of notable papers discussing the land tenure system and its consequences, and village level policy include: Benjamin and Brandt (2002), Brandt, Rozelle and Turner (2004), Deininger and Jin (2003), Jacoby, Li and Rozelle (2002) and Kung (1995).

timing of ID distribution.

The Effect of Migration on High School Enrollment

We begin our investigation of the relationship between migrant opportunity and high school enrollment by estimating equation (10) using OLS, controlling for province-year and village fixed effects (Table 8, column 0). The estimated coefficient on the size of the village migrant labor force is -0.001, and it is not statistically different than zero. Without controlling for the endogeneity of migration, there appears to be no relationship between high school enrollment and migration. However, factors such as expanded capacity in high schools or a decline in the cost of attending high schools through improved roads and public transportation may well be endogenous with factors that simultaneously lower the cost of participating in the migrant labor market.[33]

When we estimate the determinants of high-school enrollment after controlling for the endogeneity of migration, we find that the number of migrants from the village has a negative, statistically significant effect on high school enrollment (Table 8, columns 1 through 5). Holding only province-year and village fixed effects constant, an additional ten migrants from a village is associated with a 2.4 percent decrease in the probability that a middle school graduate will enroll in high school in the following year. The estimate is significant at the 5 percent level. As migrant networks increase in size and improve in quality, the net return to migrating and the opportunity cost of staying in school rises enough that we observe a substantial decline in probability of high school enrollment.

To account for time varying village economic conditions, we add the village controls to equation (2) (Table 8, column 2). We find only one coefficient that is significantly different from zero; individuals in villages with larger labor forces are more likely to enroll in high school. Larger villages are more likely to have supported their own elementary school when high school age children were younger, so children from these villages may have found it systematically less costly to obtain quality early education when younger. The inclusion of these variables does not affect the point estimate of the effect of migration on high school enrollment.

Individual and parental characteristics may also affect the decision to go to high school by contributing to differences in levels of household wealth or family preferences for education. Therefore, we add selected characteristics to the model (Table 8, columns 3 through 5). First, we add gender, an indicator variable for the first born child to the model, and an indicator variable for households in which the first born child was male (column 3). Gender does not affect the probability of enrolling in high school, which is not surprising as educational gender gaps have been narrowing in much of

[33] In Appendix Table A.1, we present descriptive statistics for all variables used in our estimation, which show average characteristics for individuals completing middle school and making the decision whether or not to enter high school in the following year. We show averages over all years and selected years in three year intervals.

rural China (e.g. Hannum, 2005). Whereas birth order might be a significant determinant of educational attainment if parents face credit constraints, restrictions on fertility make it unsurprising that the estimated coefficient on the first born child indicator is statistically insignificant.

We next add parental characteristics that reflect innate ability, proxy for wealth, and the ability to participate in migration, and continue to find that migrant opportunities negatively affect high school enrollment (columns 4 and 5). As one might expect, both the father's and mother's years of schooling have a positive effect on an individual's likelihood of attending high school (column 4). Families with more education are likely to be wealthier, more active in encouraging the child's study, or have preferences for more school. When we add measures of the number of potential male and female migrants from the household (column 5), which are the number of children ever resident in the household over 16 years of age, we find both have negative, statistically significant effects on high school enrollment.[34] When more current and former members of the household are of an age to migrate, households may have more information about employment opportunities and therefore may be less likely to send children to high school. If the migrant labor market helped relax credit constraints limiting a family's ability to enroll children in high school, or provided information about the potential returns to high school education, we would have expected a positive sign on the potential migrant variables in column 5.

Finally, other time-varying village characteristics that reflect market development could affect the relationship between migrant networks and high school enrollment decisions. For example, if IDs facilitate trade between local firms and distant partners, or make it easier for families to claim social benefits (e.g. health insurance or enrolling children in school), then issuing IDs may affect other activities that also have an influence on migration. However, most plausible stories are likely to bias against migration by increasing the profitability of local enterprises or lowering the cost of obtaining benefits locally. Furthermore, whether or not migrants have an ID, they cannot register children for subsidized education outside of their home counties, so children could not be expected to migrate to enroll in high school. To account for characteristics related to market development and the local impact of state intervention, we include another vector of time varying village level variables in our model (column 6). The average share of grain sold at quota prices is included to pick up the extent to which grain policy is binding in the village. Three variables measuring land use in activities other than grain or legume production (the share of land allocated to aquaculture, forestry, and orchards) control for the extent of specialization and marketization of

[34] The use of "potential migrants" from the household, as defined, avoids endogenous selection effects which would arise if one were to use actual migrants or even current members of the household. Information on ever-resident children from the 2004 supplemental survey makes it feasible to construct this variable.

the agricultural economy. Average household wealth per capita (housing, durable goods, savings and other financial wealth) controls for the average level of credit constraints, and the average proportion of households with some non-agricultural self-employment should pick up the effect of local household businesses. We jointly test the estimated coefficients on these variables and find that we cannot reject the null hypothesis that the coefficients are equal to zero. More importantly, their inclusion does not affect the estimated coefficient on M_{jt}. As a result, we believe that it is unlikely that time-varying unobservables related to market development bias our results. In our remaining analysis, we exclude this vector as it only introduces noise into our regressions, and all further specifications in the paper include the variables in column (5) of Table 8.

Controlling for individual characteristics, the estimated effect of village participation in migrant labor markets does not change. In each case, the coefficient estimate is between -0.019 and -0.024, and significant at the 5 percent level. At the mean level of migration in the sample, the elasticity of high school enrollment with respect to the number of migrants from the village ranges from -0.18 to -0.23, implying that a one percent increase in migration from a village reduces the probability that a middle school graduate will attend high school in the following year by 0.18 to 0.23 percent. We also perform over-identification tests on the quartic in years-since-IDs were distributed, and results from these tests offer further support that the instruments are not systematically related to unobservables influencing both migrant opportunity and enrollment in high school.[35] As an additional check that our instruments are sufficiently strong, we re-estimated the models shown in Table 8 using the bias corrected $2SLS$ estimator developed by Donald and Newey (2001). Point estimates of the effect of migration on probability of enrolling in high school were nearly the same as those estimated with the IV-GMM model, suggesting that weak instrument bias is not a concern.

Given that our primary interest lies in understanding how migration affects incentives to enroll in high school, we have devoted our attention to the coefficient on the size of the village migrant labor force in the IV-GMM model. The reduced form effect of introducing IDs on the probability of enrolling in high school is of independent interest for understanding how the instruments are performing. We thus also estimate the reduced form:

$$E_{it} = \alpha_0 + \alpha_1 ID_{jt} + \alpha_2 ID_{jt}^2 + \alpha_3 ID_{jt}^3 + \alpha_4 ID_{jt}^4 + \mathbf{Z}'_{jt}\alpha_5 + \mathbf{X}'_{ht}\alpha_6 + \mathbf{u}_j + \mathbf{p}\cdot\mathbf{T}_t + e_{ihjt} \qquad (12)$$

where ID is the years-since-IDs were issued in the county where the village is located. The estimated coefficients $\hat{\alpha}_1$, $\hat{\alpha}_2$, $\hat{\alpha}_3$, and $\hat{\alpha}_4$ can be used to predict the effect of ID availability on the probability

[35] To test for overidentification, we use the Hansen J-Statistic. It is similar to the more commonly used Sargan test but robust to heteroskedasticity (Baum, Schaffer, and Stillman, 2003).

of enrolling in high school after controlling for province-wide trends in enrollment, household and time-varying village characteristics and village fixed effects.[36] In Figure 8 we show the predicted effect of ID availability on both the number of migrants and the probability of enrolling in high school.[37] Once the effect of trends toward increased enrollment are netted out, ID availability has a pronounced negative effect on the probability of enrolling in high school.

Heterogeneity in Preferences for High School Enrollment

Families with different characteristics will not necessarily respond to migrant opportunity in the same manner. Even within villages, families with differences in preferences for education, information about employment opportunities, and credit constraints affecting the ability to attend school are likely to make different high school enrollment decisions. By examining these dimensions of heterogeneity, we can better determine the relative extent to which the opportunity cost of attending high school is driving the enrollment decision. We first expand equation (10) to include indicator variables for the following characteristics of the child's father in the year prior to the high school enrollment decision: *father is a professional* (party member, village leader or enterprise manager); *father ever had off-farm employment* (in either the migrant or local wage labor market); *father ever enrolled in high school*; and *father completed high school.*

If a child completing middle school has a father with professional status, he or she is 14.7 percent more likely to enroll in high school (Table 9; column 1, row 2). A child with a cadre or enterprise manager parent is less likely to be credit constrained, and the parent is likely to have high ability and to be better situated to influence high school admissions decisions. Similarly, a child whose father ever enrolled in high school is 17.8 percent more likely to enroll in high school (column 1, row 6). Children with parents who have some high school education will also be in families that are likely to have higher income and preferences for more education. We estimate a negative, but statistically insignificant coefficient on *father ever had off-farm employment.* In most analyses of household income in rural China, including other studies using the RCRE data source, off-farm employment is associated with higher household incomes and thus one would expect off-farm employment to ease potential credit constraints affecting the ability to enroll in high school. Alternatively, a parent with off-farm employment will also be a source of information about possible employment for a middle school graduate.[38]

[36] The estimated coefficients are jointly significant at the five percent level with an F-Statistic of 3.19.

[37] It is important to note that we obtain a very similar relationship using the quadratic and cubic in years-since-IDs, as well as less restrictive dummy variables for number of years-since-IDs were available.

[38] We use the *father is professional* and *father ever had off-farm employment* to proxy for household wealth because including more direct wealth measures would risk introducing an endogeneity bias.

We examine the heterogenous impact of migrant opportunity on the high school enrollment decision by allowing the effect of village out-migration to vary with father occupational and educational background. We interact the number of migrants from the village with *father is a professional*, *father had off-farm employment*, *father ever enrolled in high school* and *father completed high school* in columns (2) through (5), respectively. Each interaction term is treated as endogenous, and interactions of the dummies with the quartic in years-since-IDs are used as instruments. As the number of migrants from a village increases, the probability that a middle school graduate with a professional father will enroll in high school falls significantly (Table 9, column 2). At the mean level of migration in the sample, the predicted effect of father being a professional on high school enrollment drops to 10.3 percent, or 30 percent lower than the estimated effect shown in column (1). If one had been concerned that our earlier estimates reflected the enrollment decisions of individuals unlikely to have access to high school, these estimates are quite important. They imply that migrant opportunity has a stronger negative effect on the high school enrollment decision among children more likely to have access to high school.

We find a similar result when examining the effect of migrant opportunity on children with a father working in migrant or local wage employment in the previous year. Since households that participate in off-farm wage labor markets have higher incomes, we might expect a positive sign on this coefficient if credit constraints preventing enrollment in high school were relaxed by higher parent incomes. Instead, we find that a middle school graduates are less likely to enroll in high school if their fathers worked off-farm than children with fathers who did not work off-farm (column 3). Finally, we find no significant evidence that parents who have some high school education (column 4) or who completed high school (column 5) are less likely to enroll children in high school. Thus, children from families who have parents with preferences for more education may not be influenced as much by the perceived opportunity costs of remaining in school.

Direct Evidence on the Activities of High School Age Children

With the growth of migrant networks from the village, the local labor market may also experience general equilibrium effects that increase the opportunity cost of enrolling in high school. As migrants leave the village, the local labor force decreases in size, which in turn may increase the return to labor in home production (agricultural or non-agricultural family businesses) or local off-farm wage employment sufficiently to dissuade teenagers from attending high school.[39] While we lack individual information on daily earnings over time, we investigate the effects of village

[39] Figure 9, for example, shows suggestive trends indicating increases in long-term employment within the county of high school age cohorts.

migration on the following-year activity choices of individuals of the age to complete middle school and in the two years after they would normally have completed middle school. We expect that as the size of the migrant network increases, the local labor force is depleted and, as a result, we may observe that teenagers are more likely to participate in local labor market activities.

To examine how migrant network size affects activity choice, we use activity choice indicator variables contemporaneously with, one year since, and two years since the high school enrollment decision (Table 10). We again use the linear probability model and IV-GMM, and report the estimated coefficients on migrant network size. When we examine the next year's activity choice for children that would normally complete middle school in the current year, we find that results are not strong for any activity (row 1). This result may be driven either by measurement error in recollection of when individuals completed school and when they began their first work activity or by a considerable waiting period after middle school completion before young adults decide on a long-term employment activity. Results for next year's primary activity choice for individuals of an age to complete middle school one or two years earlier (shown in rows 2 and 3) suggest that they are more likely to participate in either the local or migrant wage labor market. These results provide evidence that general equilibrium effects created by a declining local labor force with migration may indeed reinforce the effect of potential employment in migrant destinations on the opportunity cost of remaining in school.

6 Conclusions and Discussion

The movement of rural laborers out of agriculture into urban and coastal areas has been an important feature of China's economic transition. While the opportunity to migrate has raised living standards in many areas of rural China, access to migrant employment appears to create a disincentive for continued increases in educational attainment levels among rural youth. Is this finding important? Over the last few years, policymakers in China and observers from international organizations have voiced considerable and growing concern over the consequences that growing inequality may have for policies that have supported economic reform and the rapid growth of China's economy. For most individuals in rural areas, the decision not to attend high school is irreversible. When large numbers of families opt out of educational investments in favor of the relatively attractive migrant wage available to middle school graduates, they effectively resign themselves to the long-term prospect of earning considerably less than urban youth, nearly all of whom graduate from high school and who are enrolling in college in greater numbers. The decision not to enroll in further schooling increases the likely gap in the lifetime earning ability of a rural child relative to an urban child, and may therefore contribute to increases in inequality, at least for one generation, within urban areas after migration occurs.

Institutional features of China's economy may continue to influence relative returns to education for urban and rural registered residents and shape the disincentives for enrollment in high school. Many cities still explicitly reserve some occupational categories for registered urban residents, and even where this practice has been relaxed there is often *de facto* segregation of rural residents into unskilled service and construction sectors, or into other relatively low skill jobs that are unwanted by urban residents.[40] So long as migrants can earn what they consider high wages as relatively unskilled workers in urban areas, the opportunity cost of high school enrollment may be higher than the returns to high school education.[41] Ending restrictions on the occupational categories in which rural migrants may be employed may create frictions between urban and rural registered migrants in the short-term, but may raise returns to high school education for rural youth and have the salutary effect of facilitating greater intergenerational economic mobility in the future.

The growing cost of university education and the lack of a well-functioning student loan program may also contribute to a decline in the perceived return to high school education. Observed returns to education in urban China are non-linear in years of schooling and driven primarily by increases in the returns to college education (Cai, Park and Zhao, 2007; Heckman and Li, 2004). In fact, the primary return to high school education may be as an input for post-secondary education (e.g. Appleton, Hoddinott, and Knight, 1996). While China's universities and colleges dramatically expanded their capacity between 1995 and 2002, the burden of covering the costs of tertiary education has also been shifted to students and their families, with average increases in tuition of nearly 600 percent between 1996 and 2001 (Du and Giles, 2007). Even as college tuitions have increased, meaningful expansions in student loan programs have not occurred, and thus the perceived probability of enrolling in college may have become more remote for rural families even as urban enrollment has increased. If the return to high school is influenced by the possibility of attending college, the sharp increase in college tuitions may help make high school less attractive in rural areas as the net return to migrant employment increases for middle school graduates.

Even in the absence of college enrollment, however, raising the share of rural-urban migrants with high school education would reduce the gap in average human capital between migrants and

[40] See Meng and Zhang (2001) for an empirical analysis on the Shanghai labor market and Solinger (1999) for a description of the differences in treatment of migrant rural and urban residents in Wuhan.

[41] Indeed, Heckman selection models examining the returns to high school education among migrants from the RCRE villages suggest that these returns are not statistically different from zero. See Appendix Table A.4 and the preceeding discussion.

urban residents born into cities. Over the longer term, raising the average educational attainment of migrants may ease their assimilation into cities as restrictions on mobility are phased out, and also contribute to a lower permanent component of inequality within urban areas. To be sure, there will likely be many activities in rural and urban areas for which a middle school education will suffice. Still, given the growing concern about the long-term consequences of continued increases in inequality, reducing the permanent component of inequality within urban areas is likely to be an important long-term benefit of policies that reduce the cost of high school education for rural students capable of continuing their education beyond middle school.

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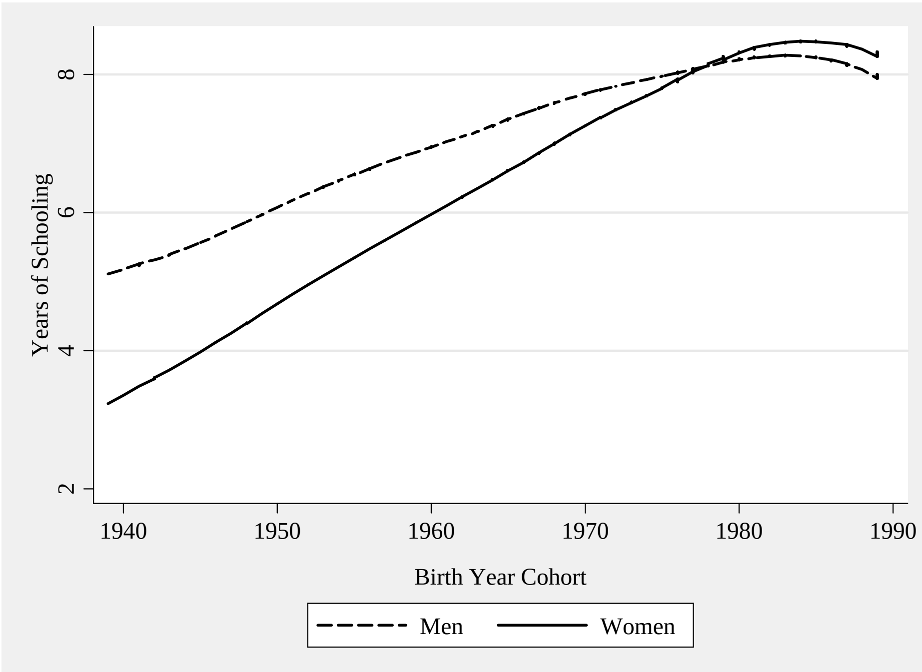
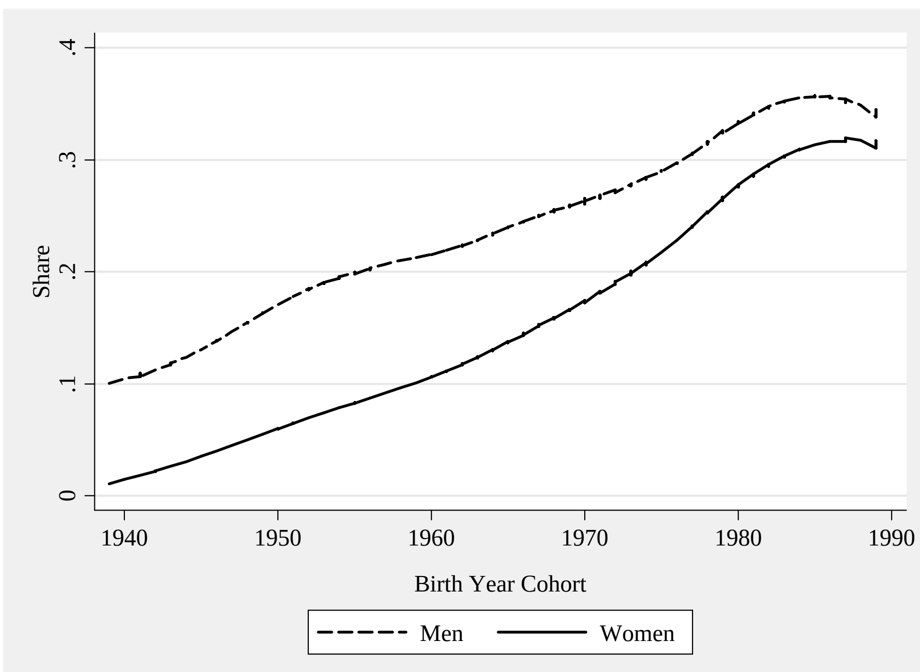
Figure 1
Cohort Average Educational Attainment
Lowess Fit



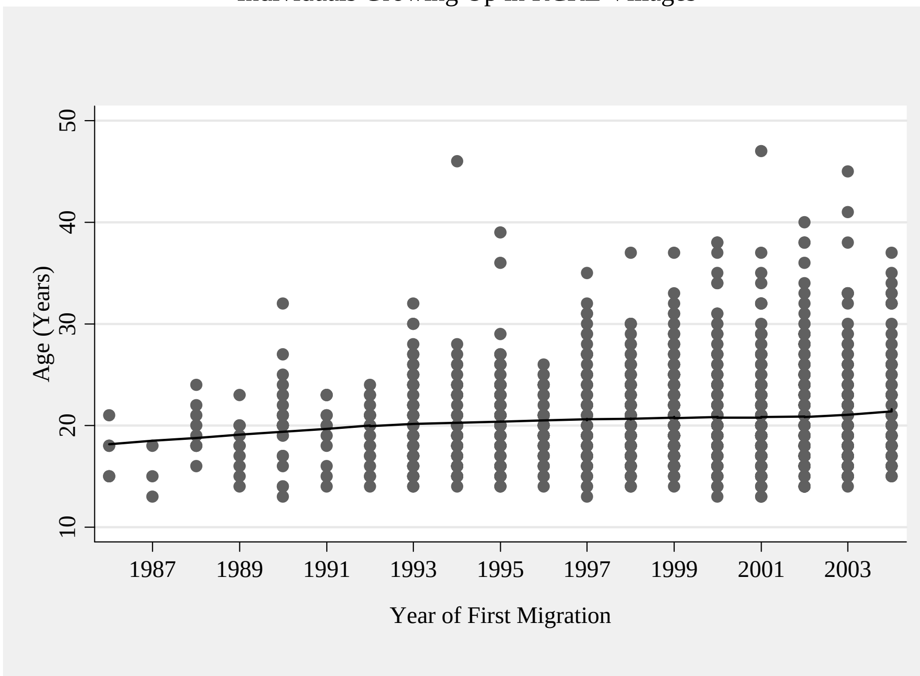
Source: RCRE Supplemental Survey (2004).

Figure 2
Share of Cohort Entering High School by Gender
Lowess Fit



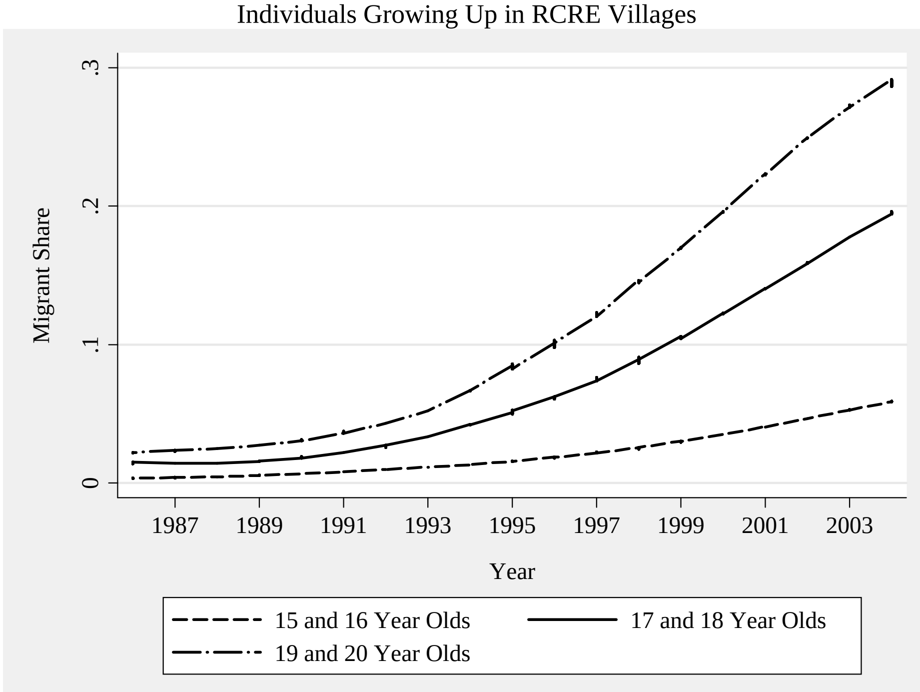
Source: RCRE Supplemental Survey (2004).

Figure 3
Age at Time of First Migration Experience
Individuals Growing Up in RCRE Villages



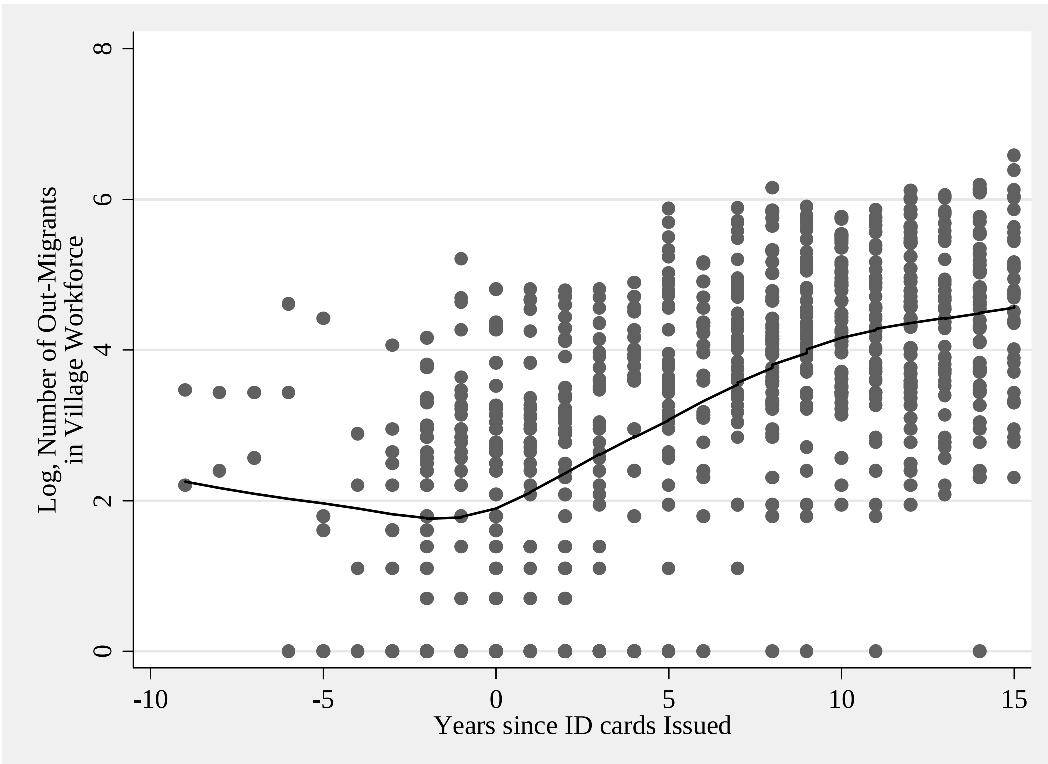
Source: RCRE Supplemental Survey (2004).

Figure 4
Share of Age Group with Temporary or Long-Term Migrant Employment
Individuals Growing Up in RCRE Villages



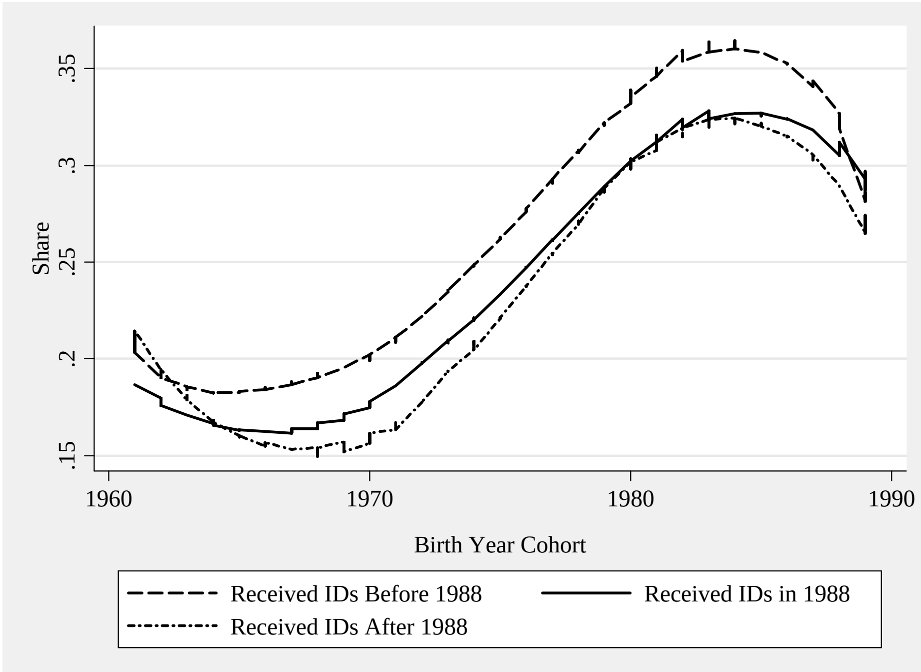
Source: RCRE Supplemental Survey (2004).

Figure 5
Working Age Laborers from Village Employed as Migrants
In Logs



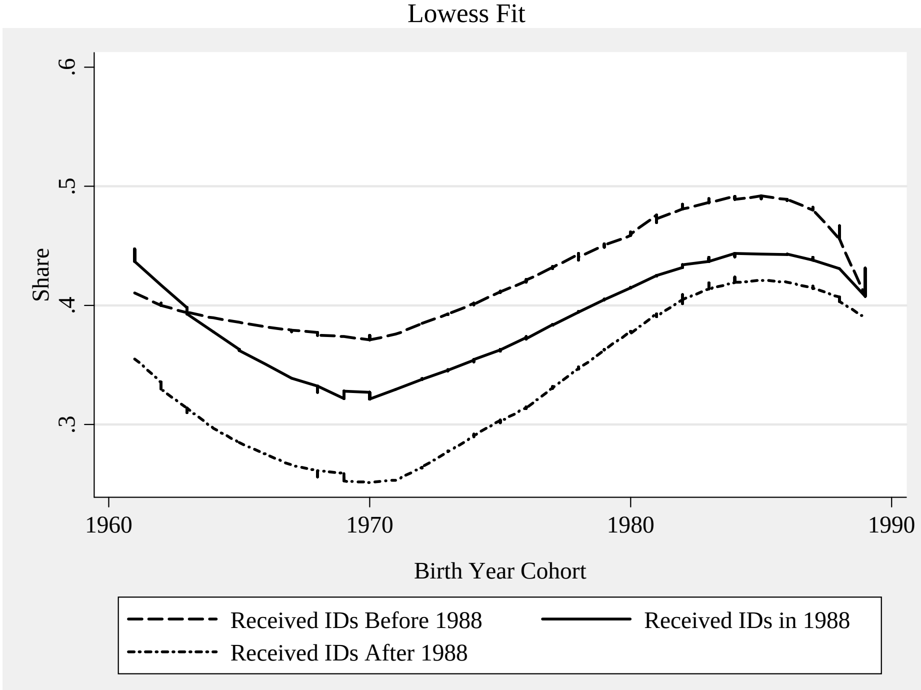
Source: RCRE Supplemental Survey (2004).
Note: We plot ln(Number of Out-Migrants in Village Workforce + 1) versus years since ID cards were issued. This is done so that villages with zero out-migrants can still be included in estimating the non-parametric relationship.

Figure 6
Share of Age Cohort Entering High School
by Timing of ID Card Receipt
Lowess Fit



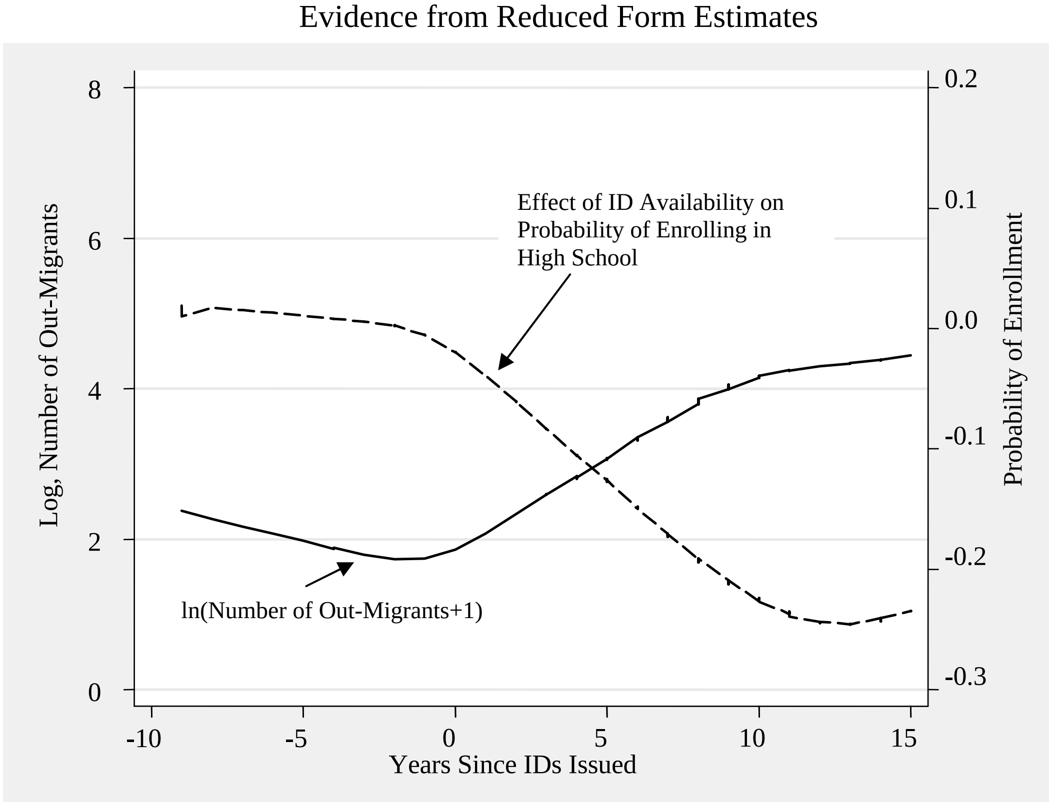
Source: RCRE Supplemental Surveys (2004).

Figure 7
Share of Middle School Graduates Entering High School
By Timing of ID Card Receipt
Lowess Fit



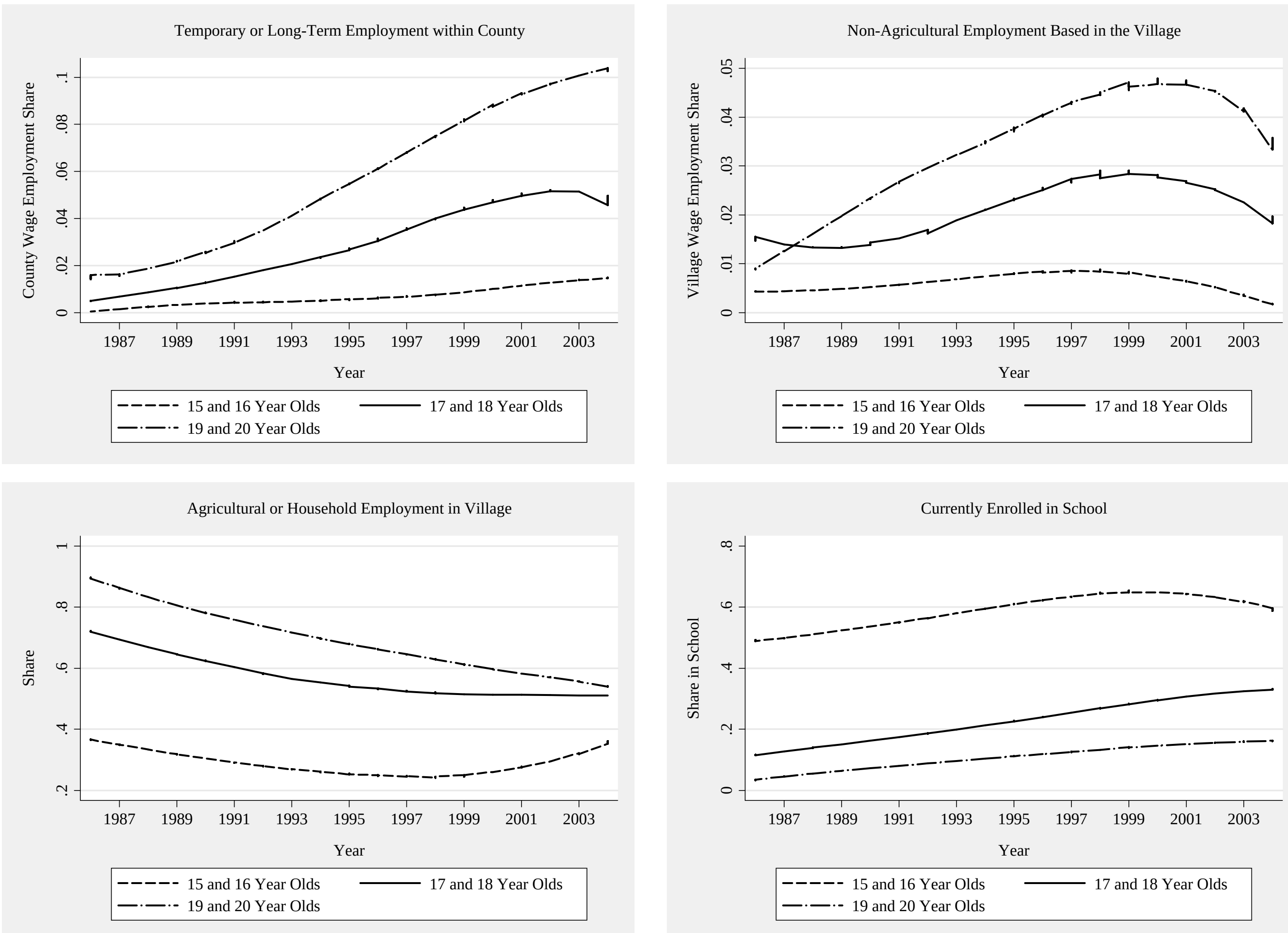
Source: RCRE Supplemental Surveys (2004).

Figure 8
What is the Direct Effect of Id Distribution on the Probability of Enrolling in High School?



Source: RCRE Supplemental Survey (2004).
Note: The solid line shows the lowess plot of ln(Number of Out-Migrants in the Village Workforce + 1) versus years since ID cards were issued. The dotted line shows the predicted effect of years since ID cards were issued on the probability of enrolling in high school. This effect is predicted from the coefficients on the quartic in years-since IDs were distributed in (11) after village fixed effects, province*year fixed effects controlling for province-wide trends, household characteristics and time-varying village effects have been partialed out. The F-statistic on the quartic in years since ID cards were issued is 3.19.

Figure 9
Share of Young Pursuing Activities other than Migrant Employment
Lowess Fit



Source: RCRE Supplemental Surveys (2004).

Table 1
Local Networks of Rural-Urban Migrants at Time of Migration
Five-City CULS Migrant Survey*

	Source Community Location	
	All Provinces	4 RCRE Provinces
Share of Migrants with:		
Job Arranged Before *First* Migration Experience	0.52	0.57
Job Arranged Before *Current* Migration Experience	0.53	0.56
Some Acquaintance from Home Village in City Before Migrating	0.91	0.94
**Close Family Member in City Before Migration	0.35	0.35
**Extended Family Member in City Before Migration	0.52	0.58
**Hometown Acquiantances	0.65	0.67
Five or Fewer Hometown Acquaintances	0.39	0.44
More than Five Hometown Acquaintances	0.27	0.24
At Least One Local Acquaintance	0.09	0.08
Number of Migrants	2,463	481

*Respondents are holders of rural registration (*hukou*). The survey was conducted in Fuzhou, Shanghai, Shenyang, Wuhan and Xian during late 2001. Sample frames were assembled using information on distribution of migrants within cities from the 2000 Population Census. After selecting neighborhoods through a proportional population sampling procedure, sample frames were assembled using residents' committee records of migrant households and registers of migrants living on construction sites and held by local by police stations. Very short-term migrants, who lack a residence that falls under the jurisdiction of either of these authorities, are unlikely to have made it into the sample frame.
**A *close family member* is adult sibling or member of nuclear family (e.g., spouse, child, parent). An *extended family member* refers to cousins or other relatives. *Hometown acquaintances* are unrelated, but known by the respondent. Note that migrants may have acquaintances in several categories, so that subcategories of acquaintances will add to more than 100.

Table 2
Educational Attainment of Migrants

Panel A. Education Attainment and Age at First Migration of Rural-Urban Migrants from Five-City CULS Migrant Survey*

	Source Community	
	All Provinces	4 RCRE Provinces
Education		
Elementary or Less	0.247	0.220
Some Middle School	0.086	0.096
Middle School	0.485	0.501
Some High School	0.039	0.045
High School	0.120	0.120
Some Post Secondary	0.009	0.011
College	0.010	0.012
Number of Observations	2,463	481

*Source: China Urban Labor Survey (see discussion on note of Table 1).

Panel B. Nationally Representative Evidence on Age and Educational Attainment of the Rural Registered Population by Broad Occupation Category

	Primary Occupation			
	Agricultural	Local, Non-Agricultural	Migrant	Total
Age	41.4	38.58	28.62	38.7
Male Share	0.46	0.63	0.63	0.52
Years of Education	7.35	8.98	8.87	7.87
Educational Attainment				
Illiterate	0.09	0.03	0.02	0.07
Primary	0.37	0.19	0.16	0.30
Middle School	0.45	0.55	0.67	0.51
High School	0.09	0.21	0.14	0.12
College	0.00	0.02	0.01	0.00
Observations	130533	30241	30936	191710

Source: National Bureau of Statistics (NBS) 2003 Rural Household Survey (Full National Sample), from Park and Zhao (2006).

Table 3
Average Village Characteristics in 1988
by Timing of ID Card Distribution

		Year ID Cards Were Issued		
		prior to 1988	in 1988	after 1988
Share of Productive Assets Owned by the Village Collective	mean	0.399	0.242	0.246
	std. dev	0.277	0.189	0.276
Mean Consumption Per Capita	mean	414.3	349.3	405.1
	std. dev	154.6	131.6	86.9
Mean Income Per Capita*	mean	627.2	481.5	558.1
	std. dev	243.3	183.5	162.4
Cultivable Share of Total Land Area	mean	0.691	0.546	0.512
	std. dev	0.277	0.273	0.309
Share in Mountains	mean	0.14	0.24	0.3
	std. dev	0.36	0.43	0.48
Share Near a City	mean	0.21	0.04	0.08
	std. dev	0.43	0.20	0.28
Cropped Land Gini Ratio	mean	0.21	0.15	0.17
	std. dev	0.07	0.05	0.05
Average Household Size	mean	4.40	4.72	4.68
	std. dev	0.66	0.47	0.53
Total Village Land	mean	4508	4633	7676
	std. dev	4694	4676	9401
Male Share in Population	mean	0.51	0.51	0.50
	std. dev	0.02	0.02	0.02
Share of Labor Force Earning Wage Locally	mean	0.27	0.14	0.16
	std. dev	0.21	0.12	0.22
Village Population	mean	1646	1284	1501
	std. dev	1089	548	925
Village Consumption Per Capita Gini	mean	0.18	0.16	0.16
	std. dev	0.03	0.03	0.03
Village Income Per Capita Gini	mean	0.23	0.22	0.21
	std. dev	0.07	0.05	0.07
Average Years of Schooling, aged 18-22	mean	8.75	7.56	7.50
	std. dev	3.44	2.02	2.03
Share of 15-18 Year Olds Enrolled in High School	mean	0.41	0.35	0.31
	std. dev	0.25	0.16	0.16
Observations		14	25	13

Notes:
*Indicates difference is statistically signicant at the 10th Percentile.
1. Consumption and income per capita are reported in 1986 RMB Yuan.
2. Sources: RCRE Household and Village Surveys (1986 to 2003), and RCRE Supplemental Surveys (2004).

Table 4

Reported Age Starting Primary School

Individuals Age 10 to 34 in 2000

Age	Number	Share
4	6	0.002
5	56	0.021
6	530	0.198
7	1336	0.499
8	639	0.239
9	83	0.031
10	18	0.007
11	6	0.002
12	2	0.001
13	2	0.001
14	1	0.000

Source: China Center for Agricultural Policy (CCAP) Data Set, 2000. See the Appendix of de Brauw et al (2002) for a description of the CCAP survey.

Table 5
Proportion of Individuals Staying in School
by Grade and Primary School Type

	Six Year Primary Schools		Five Year Primary Schools	
Grade	Proportion	N	Proportion	N
2	1.00	1310	1.00	4193
3	1.00	1310	0.99	4186
4	1.00	1296	0.99	4118
5	0.99	1285	0.98	4019
6	0.98	1257	0.91	3904
7	0.95	1211	0.95	3484
8	0.92	1122	0.87	3238
9	0.90	1011	0.43	2712
10	0.47	877	0.68	1134
11	0.95	388	0.84	729
12	0.91	351	0.62	574
13	0.36	305	0.59	329
14	0.91	100	0.81	183
15	0.83	83	0.58	138
16	0.36	61	0.32	74
17	0.40	20	0.21	24
18	0.80	5	0.50	4
19	0.00	3	0.50	2
20	0.00	0	0.00	1

Notes: Proportions are conditional on school enrollment the previous year.
Assumes children start school at age 7 and do not skip.
Source: RCRE Supplemental Survey (2004).

Table 6
What Factors Determine the Size of the Village Migrant Network?
First-Stage Regression Using the Sample of Individuals Completing Middle School, 1986-2003

	Dependent Variable: Number of Registered Village Residents Working as Migrants						
Model	1a	1b	1c	2	3	4	5
Years Since IDs issued	1.154	0.206	-0.829	-0.733	-0.746	-0.764	-0.769
	(0.211)	(0.323)	(0.478)	(0.451)	(0.451)	(0.451)	(0.451)
Years Since IDs Issued Squared	-0.007	0.123	0.405	0.391	0.391	0.394	0.394
	(0.008)	(0.035)	(0.103)	(0.099)	(0.099)	(0.099)	(0.099)
Years Since IDs Issued Cubed		-0.005	-0.032	-0.032	-0.032	-0.032	-0.032
		(0.001)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)
(Years Since IDs Issued)^4			0.008	0.008	0.008	0.008	0.008
			(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Ln(Village Average Income Per Capita)				0.748	0.746	0.713	0.702
				(0.609)	(0.609)	(0.610)	(0.610)
Total Land in Village (Mu)				4.059	4.056	4.175	4.210
				(2.072)	(2.075)	(2.076)	(2.077)
Cultivable Land Gini Coefficient				0.059	0.059	0.059	0.059
				(0.015)	(0.015)	(0.015)	(0.015)
Size of Village Workforce				0.045	0.045	0.045	0.045
				(0.006)	(0.006)	(0.006)	(0.006)
Cultivable Share of Village Land				2.055	2.058	2.069	2.049
				(1.413)	(1.413)	(1.414)	(1.416)
Gender (1=male, 0=female)					-0.385	-0.412	-0.406
					(0.221)	(0.222)	(0.222)
First Born? (1=yes, 0=no)					0.029	0.044	0.163
					(0.216)	(0.218)	(0.327)
First Born in Household is Male? (1=yes, 0=no)					0.084	0.100	0.024
					(0.238)	(0.239)	(0.265)
Father's Years of Schooling						-0.052	-0.052
						(0.046)	(0.046)
Mother's Years of Schooling						0.036	0.037
						(0.050)	(0.050)
Number of Potential Migrants, Male							0.159
							(0.241)
Number of Potential Migrants, Female							0.011
							(0.205)
Number of Observations	3160	3160	3160	3068	3068	3068	3068
r2	0.727	0.728	0.729	0.757	0.758	0.758	0.758
F-Statistic on Instruments	22.57	20.12	17.27	16.27	15.98	15.99	15.85
Partial r2, Instruments	0.014	0.019	0.021	0.020	0.020	0.020	0.019

Notes: Columns 1c through 5 are the first stage of instrumental variable regressions shown in models 1 to 5 of Table 7. The F-statistic tests the hypothesis that the estimated coefficients on the instruments are zero. All F statistics are significant at the one percent level. In parentheses, we show robust standard errors that allow for arbitrary correlation within villages. All regressions control for factors related to village location with village fixed effects, and macroeconomic shocks using province-year fixed effects.

Table 7
Are the "Years-Since IDs" Instruments Correlated with Time-Varying Village Policies?
F-Statistics on Instruments (F-Probabilities)

	Explanatory Variables Included	
Policy Variable	Instruments (Quartic in Years Since ID Cards Issued)	Instruments + Household and Village Controls
Share of Grain Sold at Quota Price (Calculated by Value)	0.67 (0.618)	0.39 (0.817)
Share of Grain Sold at Quota Price (Calculated by Weight)	0.42 (0.796)	0.50 (0.739)
Share of Village Land Planted in Orchard Crops	2.05 (0.102)	0.63 (0.640)
Share of Households Renting In Land	0.85 (0.501)	1.01 (0.413)
Share of Households Renting Out Land	1.20 (0.323)	1.08 (0.378)
Average Village Per Capita Local Tax Rates Paid by Households	0.73 (0.574)	0.67 (0.619)

Notes: Each policy variable listed is the dependent variable in regression models and we report the F-Statistic for the hypothesis that the coefficients on the quartic in years since IDs were issued are jointly zero. The number in parentheses is the p-value for the F-statistic. All models include village and province-year dummy variables and standard errors are robust to within village correlation of residuals. Models that include additional household and village controls (shown in the second column), include all regressors shown in column 5 of Table 6. These additional controls include: ln(village average income per capita), total land in the village, gender, first-born, first-born in household is a male, father's years of schooling, mother's years of schooling, number of potential male migrants (males over age 16 ever a member of the household), and number of potential female migrants.

Table 8
Determinants of High School Enrollment
Conditional on Completing Middle School, 1986-2003

	Dependent Variable: Enroll in High School Next Year = 1						
Model	0	1	2	3	4	5	6
	OLS	IV-GMM	IV-GMM	IV-GMM	IV-GMM	IV-GMM	IV-GMM
(Number of Migrants from Village)/10	-0.001	-0.024	-0.024	-0.023	-0.020	-0.019	-0.020
	(0.002)	(0.009)	(0.010)	(0.010)	(0.009)	(0.009)	(0.011)
Gender (1=male)				0.030	0.039	0.039	0.038
				(0.024)	(0.024)	(0.024)	(0.024)
First Born (1=yes)				0.018	-0.001	-0.046	-0.044
				(0.020)	(0.018)	(0.022)	(0.022)
First Born in Household was Male (1=yes)				-0.057	-0.071	-0.062	-0.060
				(0.021)	(0.022)	(0.023)	(0.023)
Father's Years of Schooling					0.025	0.024	0.025
					(0.004)	(0.004)	(0.004)
Mother's Years of Schooling					0.030	0.029	0.029
					(0.004)	(0.004)	(0.004)
Number of Potential Migrants, Household, Male						-0.046	-0.046
						(0.019)	(0.019)
Number of Potential Migrants, Household, Female						-0.026	-0.027
						(0.015)	(0.016)
ln(Village Mean Income Per Capita)			0.047	0.042	0.035	0.035	-0.014
			(0.101)	(0.095)	(0.092)	(0.090)	(0.089)
Village Total Land			0.031	0.032	0.023	0.009	0.015
			(0.241)	(0.237)	(0.223)	(0.220)	(0.234)
Village Cultivable Land Per Capita Gini			0.0001	0.0001	0.001	0.001	0.001
			(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
(Village Labor Force)/10			0.002	0.002	0.001	0.001	0.001
			(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Cultivable Share of Village Land			0.183	0.173	0.096	0.098	0.120
			(0.146)	(0.143)	(0.129)	(0.129)	(0.142)
Additional Time-Varying Village Variables?	no	no	no	no	no	no	yes
Chi-Square Test, Time-Varying Village Variables							4.57
p-value, Chi-Square Test							0.600
Over-ID Test: Hansen J-Statistic		1.432	5.345	5.246	4.948	4.894	5.441
P-value, J-statistic		0.698	0.148	0.155	0.176	0.180	0.142
F-Test		17.268	16.266	15.978	15.986	15.852	13.024
P-value, F-statistic		0.000	0.000	0.000	0.000	0.000	0.000
Partial r2		0.018	0.013	0.013	0.013	0.013	0.006
Number of Obs.	3160	3160	3068	3068	3068	3068	3068

Notes: In parentheses, we show robust standard errors that allow for arbitrary correlation within villages. All regressions control for factors related to village location with village fixed effects, and macroeconomic shocks using province*year fixed effects. Additional time-varying village level variables in model 6 include the average proportion of households with non-agricultural self-employment, the share of grain sold at quota, the logarithm of average household wealth, the share of land allocated to aquaculture, the share of land allocated to forestry, and , the share of land allocated to orchards. Models 1-6 are estimated using an instrumental variables-generalized method of moments estimator that is efficient in the presence of presence of heteroskedasticity and arbitrary within village cluster correlation (see Wooldridge 2002, page 193).

Table 9
Does the Effect of Migrant Opportunity Differ with Family Characteristics?

	Dependent Variable: Enroll in High School=1				
Model	1	2	3	4	5
Number of Migrants/10	-0.022	-0.018	-0.015	-0.017	-0.018
	(0.011)	(0.009)	(0.009)	(0.010)	(0.010)
Father is Professional (1=yes)	0.147	0.258	0.102	0.141	0.162
	(0.054)	(0.084)	(0.042)	(0.051)	(0.049)
(Number of Migrants/10)*(Father is Professional)		-0.016			
		(0.009)			
Father had Off-Farm Work (1=yes)	-0.059	-0.079	0.081	-0.047	-0.070
	(0.040)	(0.037)	(0.057)	(0.038)	(0.039)
(Number of Migrants/10)*(Father had Off-Farm Work)			-0.015		
			(0.006)		
Father Enrolled in High School (1=yes)	0.178	0.183	0.171	0.229	0.167
	(0.037)	(0.036)	(0.036)	(0.054)	(0.034)
(Number of Migrants/10)*(Father Enrolled in High School)				-0.005	
				(0.005)	
Father completed High School (1=yes)	0.030	0.008	0.030	0.028	0.041
	(0.040)	(0.038)	(0.040)	(0.036)	(0.090)
(Number of Migrants/10)*(Father Completed High School)					-0.003
					(0.008)
Hansen J statistic	5.182	11.012	6.734	6.598	7.567
p-value, J statistic	0.159	0.088	0.346	0.360	0.272
F statistic, Number of Migrants	8.80	4.55	6.17	5.25	5.60
F statistic, interaction term instruments=0		45.76	47.22	27.71	67.86
Number of Observations	2918	2918	2918	2918	2918

Notes: In parentheses, we show robust standard errors that allow for arbitrary correlation within villages. All models control for factors related to village location with village fixed effects, and macroeconomic shocks using province*year fixed effects, as well as village and individual level controls listed in column 5 of Table 8. All models are estimated using an instrumental variables, generalized method of moments estimator that is efficient in the presence of heteroskedasticity and arbitrary within village cluster correlation (see Wooldridge 2002, page 193).

Table 10
Estimated Effect of Village Migration on Youth Activity Choice

	Activity Choice Next Year:			
	In School?	Participate in Agricultural or Home Labor	Participate in Local Wage Labor	Participate in Migrant Labor Market
Age to Complete Middle School this Year	-0.023	-0.005	-0.001	0.002
	(0.009)	(0.011)	(0.001)	(0.001)
Age to Complete Middle School last Year	-0.006	-0.005	0.010	0.009
	(0.012)	(0.010)	(0.004)	(0.002)
Age to Complete Middle School Two Years Ago	0.007	-0.031	0.012	0.009
	(0.008)	(0.011)	(0.008)	(0.003)

Notes: In parentheses, we show robust standard errors that allow for arbitrary correlation within villages. All regressions control for factors related to village location with village fixed effects, and macroeconomic shocks using province*year fixed effects, as well as village and individual level controls listed in column 5 of Table 8. All models are estimated using an instrumental variables, generalized method of moments estimator that is efficient in the presence of heteroskedasticity and arbitrary within village cluster correlation (see Wooldridge 2002, page 193).

Appendix Table 1

Descriptive Statistics for Children Graduating from Middle School

Selected Variables, for Selected Years

	All	Year					
	Years	1987	1990	1993	1996	1999	2002
Individual Level Variables							
Enrolled in High School? (1=yes)	0.43	0.32	0.44	0.41	0.42	0.47	0.47
	(0.47)	(0.47)	(0.50)	(0.49)	(0.49)	(0.50)	(0.50)
Gender (1=male)	0.57	0.58	0.60	0.58	0.53	0.53	0.48
	(0.50)	(0.49)	(0.49)	(0.49)	(0.50)	(0.50)	(0.50)
First Born (1=yes)	0.45	0.47	0.49	0.46	0.52	0.50	0.37
	(0.50)	(0.50)	(0.50)	(0.50)	(0.50)	(0.50)	(0.48)
Birth Order	1.87	1.92	1.94	1.92	1.76	1.71	1.94
	(1.04)	(1.12)	(1.18)	(1.14)	(1.02)	(0.85)	(0.93)
Household Level Variables							
First Born in Household	0.40	0.28	0.44	0.43	0.38	0.42	0.43
was Male (1=yes)	(0.50)	(0.45)	(0.50)	(0.50)	(0.49)	(0.50)	(0.50)
Father's Years of Schooling	6.39	5.44	5.52	6.25	6.47	7.27	6.79
	(3.21)	(3.28)	(3.28)	(3.32)	(3.16)	(3.06)	(3.04)
Mother's Years of Schooling	4.22	3.30	3.07	3.67	4.23	5.02	5.14
	(3.30)	(3.03)	(2.99)	(3.22)	(3.36)	(3.17)	(3.32)
Number of Potential Migrants,	0.46	0.30	0.47	0.45	0.44	0.45	0.54
Household, Male	(0.62)	(0.48)	(0.58)	(0.61)	(0.59)	(0.62)	(0.62)
Number of Potential Migrants,	0.49	0.25	0.51	0.55	0.52	0.47	0.59
Household, Female	(0.71)	(0.48)	(0.69)	(0.81)	(0.81)	(0.66)	(0.79)
Village Level Variables							
Number of Migrants from	90.5	18.6	18.6	74.0	107.4	99.3	188
Village	(110)	(28.7)	(27.0)	(83.7)	(119.2)	(83.5)	(136)
ln(Village Mean Income Per Capita)	6.42	6.20	6.21	6.22	6.52	6.52	6.66
	(0.39)	(0.32)	(0.35)	(0.31)	(0.32)	(0.38)	(0.31)
ln(Village Mean Wealth Per Capita)	8.80	8.62	8.51	8.69	8.89	8.93	9.07
	(0.55)	(0.48)	(0.57)	(0.48)	(0.50)	(0.50)	(0.45)

Appendix Table 1 Continued on Next Page

Appendix Table 1 (Continued)

	All Years	1987	1990	1993	1996	1999	2002
		Year					
Village Total Land (mu)	5090	4820	5080	4870	5200	5100	5760
	(5710)	(5110)	(5190)	(5500)	(5310)	(6240)	(6460)
Village Cultivable Land Per Capita Gini	0.19	0.19	0.19	0.20	0.20	0.23	0.25
	(0.10)	(0.10)	(0.06)	(0.07)	(0.07)	(0.11)	(0.09)
Village Labor Force	861	780	851	867	899	820	948
	(486)	(352)	(419)	(433)	(470)	(487)	(559)
Cultivable Share of Village Land	0.58	0.60	0.57	0.62	0.55	0.57	0.54
	(0.28)	(0.26)	(0.28)	(0.28)	(0.28)	(0.29)	(0.31)
Years Since IDs Issued	7.37	0.33	2.12	4.86	7.87	11.01	13.86
	(5.11)	(1.02)	(1.65)	(2.07)	(2.20)	(2.23)	(2.28)
Cultivable Share of Village Land	0.58	0.60	0.57	0.62	0.55	0.57	0.54
	(0.28)	(0.26)	(0.28)	(0.28)	(0.28)	(0.29)	(0.31)
Forest Share of Village Land	0.15	0.16	0.16	0.15	0.14	0.16	0.19
	(0.27)	(0.27)	(0.25)	(0.27)	(0.25)	(0.28)	(0.30)
Orchards Share of Village Land	0.04	0.02	0.03	0.04	0.07	0.06	0.06
	(0.07)	(0.03)	(0.05)	(0.06)	(0.10)	(0.10)	(0.09)
Aquaculture Share of Village Land	0.04	0.05	0.05	0.04	0.04	0.04	0.05
	(0.06)	(0.06)	(0.05)	(0.05)	(0.05)	(0.05)	(0.08)
Share of Households with Non-Agricultural Self-Employment Income	0.56	0.66	0.66	0.55	0.57	0.49	0.51
	(0.28)	(0.27)	(0.27)	(0.27)	(0.25)	(0.28)	(0.26)
Quota Share of Grain Produced	0.09	0.12	0.12	0.08	0.10	0.07	0.03
	(0.08)	(0.10)	(0.09)	(0.08)	(0.08)	(0.07)	(0.05)
Scaled Lagged July-November Rainfall Shock, Squared	0.15	0.02	0.02	0.02	0.04	0.02	0.02
	(2.12)	(0.04)	(0.07)	(0.02)	(0.05)	(0.05)	(0.05)
Number of Observations	3068	158	162	237	262	238	187

Notes: The first column includes descriptive statistics for all years; the second through seventh columns include descriptive statistics for selected years.

Sources: RCRE Supplemental Survey (2004), Annual RCRE Household and Village Surveys (1986-1991, 1993, 1995-2003).

Appendix Table A2
Hazard Model for Distribution of ID cards

	Dependent Variable: 1 when card is issued; 0 otherwise					
	(1)		(2)		(3)	
	coefficient	marginal	coefficient	marginal	coefficient	marginal
Squared Rainfall Shock, lagged once	-2.433 (2.892)	-0.030 (0.038)			-2.439 (2.907)	-0.030 (0.039)
Squared rainfall shock, lagged twice			0.356 (3.126)	0.004 (0.039)	0.385 (3.108)	0.005 (0.038)
Number of Obs.	314		304		304	
Log Likelihood	-86.8		-89.5		-89.3	
Chi-Square Statistic					0.72	
p-value, est. coeffs. are jointly zero					0.698	

Notes: We alternatively use the squared rainfall shock in year t-1 and year t-2, and combine them. Provincial dummies and year dummies included in all equations. Hypothesis tests are chi-squared tests for the null hypothesis that all coefficients are jointly zero. Marginal effects are estimated at the mean values of squared rainfall shocks.

A.3. Evidence on Returns to Education of Migrants from RCRE Villages

To assess how returns in the labor market might influence the decision to enroll in high school, we use a module added to the 2003 round of the RCRE survey designed to study the returns in migrant labor markets. For individuals who had out-migrated from RCRE households in 2003, the RCRE survey collected information on earnings, the cost of migration and the number of days individuals worked as migrants. Using a sample of all adult children of the household head and spouse who were between 15 and 50 years old, we estimate the net returns to education for migrants using a Heckman selection model (Appendix Table A.3). Our objective is to get a sense of whether returns to education in the labor market are consistent with the observed decline in high school enrollment with expanding migrant opportunity. For the selection equation, we use household land per capita and demographic characteristics (e.g. household size, number of laborers, number of elderly in the household, the household dependency ratio, the male/female ratio and number of children under 5). On average, we find that an additional year of education has a return of 2.9 percent (model 1).

To separately estimate the returns to years of schooling for primary and middle school, high school, and post-high school education, we introduce a linear spline in model 2. We find a higher return to primary, middle school and post-secondary years of schooling than to high school. We estimate returns to education for years greater than or equal to 9 through 12 in order to make sure that we are measuring returns to years of high school education for this range. Villages with five year primary schools will have one year of high school pooled with grades 0 to 8. Specifically, we estimate an average return of 4.0 percent to primary and middle school, but only a statistically insignificant 0.3 percent return to a year of high school (model 2). The return to post-secondary education, consistent with findings by Giles et al (2004) and Heckman and Li (2004), is higher at 4.7 percent, but also statistically insignificant. These estimated returns to schooling are much below recent estimates of returns among urban workers. This may reflect measurement error bias, measurement problems in the calculation of net daily migrant wages, or reflect bias against rural migrants in urban labor markets.

Moreover, the selection coefficient on years of high school education is negatively related to whether an individual is a migrant or not, implying that individuals who stay in the village are more likely to go to high school. Returns to high school for rural migrants in urban areas are low, while individuals with a high school education in rural areas are able to qualify for more lucrative positions in village or township government or as managers (or owners) of local enterprises.

Appendix Table A.3
Returns to Education Among Migrants from RCRE Villages in 2003
Heckman Selection Models

	Model 1		Model 2	
	ln(Daily Migrant Wage)	Migrant? (1= Yes)	ln(Daily Migrant Wage)	Migrant? (1= Yes)
Years of Schooling	0.029 (0.012)	-0.007 (0.014)	--	--
0<=Years of Schooling <9	--	--	0.040 (0.019)	0.072 (0.022)
9<=Years of Schooling <12	--	--	0.003 (0.034)	-0.126 (0.036)
Years of Schooling>=12	--	--	0.047 (0.059)	-0.029 (0.068)
Age	0.146 (0.041)	0.285 (0.043)	0.149 (0.034)	0.286 (0.042)
Age Squared	-0.003 (0.001)	-0.005 (0.001)	-0.002 (0.001)	-0.005 (0.001)
Male	0.213 (0.053)	0.311 (0.061)	0.217 (0.052)	0.307 (0.061)
Fathers Years of Education	-0.013 (0.010)	-0.0283 (0.011)	-0.012 (0.009)	-0.027 (0.011)
Mothers Years of Education	0.008 (0.010)	-0.005 (0.012)	0.008 (0.010)	-0.005 (0.011)
Household Size	--	-0.010 (0.044)	--	-0.020 (0.044)
Number of Adult Laborers	--	0.054 (0.046)	--	0.057 (0.046)
Household Land Per Capita	--	-0.115 (0.052)	--	-0.126 (0.052)
Number of Elderly in Household	--	-0.054 (0.038)	--	-0.045 (0.038)
Dependency Ratio	--	-0.079 (0.178)	--	-0.087 (0.179)
Male/Female Ratio	--	-0.354 (0.202)	--	-0.317 (0.202)
Number of Children Under 5	--	-0.197 (0.068)	--	-0.203 (0.069)
Number of Observations	3880		3880	
Censored Observations	3101		2101	
Uncensored Observations	779		779	

Notes: Individual information necessary to estimate daily returns to education from migrant employment are only available for the 2003 survey. We estimate returns to education in migrant employment for children of the household head and spouse who are under 50 and over 15 years of age. Robust standard errors are shown in parentheses.