Why Might Credit Used to Finance Investments Increase Child Labor?*

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First version: June 10, 2004

This version: September 26, 2005

Keywords: Investment Credit, Schooling, Child-labor, Pakistan.

JEL Classification Number: J24, J13, O16, O12.

* I am indebted to Eric Edmonds, Moshe Hazan, Elizabeth King, Takashi Kurosaki, Rachel McCulloch, Priya Ranjan, Steve Cecchetti, Narayanan Subramanian, and Bruce Wydick. Thanks also to discussants and participants at the 2005 American Economic Association (AEA) Meetings, 2005 Northeast Universities Development Conference, and Brandeis University's economics department seminar series. Tak Hin Benjamin Ngan provided excellent research assistance. Funding from the Tomberg family research grant is gratefully acknowledged. I am responsible for all errors that remain.

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Abstract

It is generally assumed that credit has a positive effect on children's schooling among poor households. This paper shows that need not be the case when households obtain credit for investment purposes. In fact, investment loans may *not have any effect* on the likelihood of schooling for children who work in their family business. Our estimates confirm that this is the case; credit used to finance investments has no effect on the odds of schooling for employed children. This may be because investment loans increase children's labor productivity, which in turn increases the opportunity cost of schooling. The results of this study suggest that improving access to credit may not, by itself, constitute a solution to the problem of child labor in developing countries.

1 Introduction

Among poor households in developing countries, decisions regarding children's schooling involve a trade-off between the immediate gains to be made from having the child work for a wage against the future benefits of investing in the child's education. For a household on the edge of subsistence, the optimal choice is all too often to have the child work rather than to study in school. Their children, as a result, are less likely to build the human capital necessary for high wage employment. Consequently, the household remains trapped in a low income environment.

In this context, access to credit enables a household to transfer consumption across time, and gives it more flexibility in the child schooling-labor decision. Becker (1975) and Mincer (1974) show that with well-functioning credit markets, households make optimal human capital investments for their children. In this paper, we show that this positive effect of credit on schooling need not apply to the case of investment credit taken by households with family owned and operated enterprises. We build the intuition for this result using a simple two period theoretical model in which a household maximizes utility by choosing optimal levels of investment credit and child labor. The predictions of our model are confirmed using data on children from Pakistan.

Consider a two period model in which the child's schooling takes place in the first period (if at all) and the second period is devoted to work in the family business. If the child attends school in the first period, he builds human capital, while if he works in the family enterprise, he builds enterprise specific capital. Both types of capital enter a neo-classical production function, along with physical capital and labor. In this setting, investment credit leads (by definition) to greater physical capital, which raises the marginal product of both human and enterprise specific capital. If the latter effect is stronger, then the household

will choose to complement the additional physical capital with additional enterprise specific capital rather than human capital. This leads to a switch away from schooling towards work in the family enterprise.

There are two reasons why a household may not be able to substitute labor and human capital from outside markets for that of its own child. First, hired labor may need more monitoring because of problems such as shirking, which may make it too expensive. Second, as argued in Wydick (1999), where product quality is important, households often prefer to train their own children, since future returns to such training remain within the household, while control over future returns is not guaranteed from training hired labor.[1] Households will differ in the strength of these two factors, and in our empirical work, we control for these by incorporating information on whether the household employs paid workers in the non-farm enterprise (NFE), and by including a dummy for non-farm enterprises that require skilled labor (handicrafts, furniture making, leather and wood works, and so on).

In the empirical section of the paper, we study the effects of credit on children's schooling using data from Pakistan. We find that credit does *not* increase the likelihood of school attendance for children who work in their household's non-farm enterprise. We also present evidence that as compared to households which take investment loans and in which only adults work, the overall contribution to output is larger in households which take such loans and in which both adults and children work. Hence it is rational for households that bor-

[1]This raises the issue of schooling versus on-the-job training in less developed countries. If the quality of schooling provided is poor or if the returns to education are low, then it may be optimal for households to employ their children in the home enterprise. Chamarbagwala (2004) uses data from India to study the interaction between education, child labor and schooling in environments where employment opportunities for educated workers are scarce.

row to finance investments to employ their children in the family business. This may follow from the fact that investment loans increase the marginal product of children's labor, which includes raw labor and enterprise specific capital. Increases in the marginal product of labor translate into increases in the opportunity cost of schooling. With higher opportunity cost of schooling, households that employ children in the home enterprise are less likely to send them to school. These results refute the hypothesis that increasing access to credit is *sufficient* to increase schooling in developing countries. Although this may be correct in the case of loans obtained for consumption-smoothing purposes, it may not apply to cases where loans are obtained to finance investments.

Section 2 presents a review of previous research. Sections 3 and 4 discuss the theoretical and empirical models, respectively. Details of the data are discussed in section 5, and results are presented in section 6. Section 7 concludes with policy implications. All tables are presented at the end of the paper.

2 Literature Review

In this section, we discuss previous research on the link between access to credit and child labor. In doing so, we also include studies that consider the effect of increases in income on child labor. We recognize that although credit increments income, it differs in its implications and effects from other sources of income increases such as remittances. In order to present a comprehensive review of past literature, this section discusses the implications on child labor of both credit and other additions to income.

Economists recognize that child labor is linked to imperfections in household credit markets. Negative shocks to income (such as temporary unemployment) force the poorest

households to depend on the earnings of their children,[2] while households with savings or access to credit can smooth the effects of a fall in income without disrupting their children's schooling. For example, Jacoby & Skoufias (1997) find that the incidence of child labor in rural India worsens with increases in the variability of household income. Lack of access to formal credit markets exacerbates this problem. As they note, "...child labor...appears to play a significant role in the self-insurance strategy of poor households ..."[3] Access to credit in times of need thus appears to be a crucial determinant of child labor. This suggests that increasing the availability of credit to poor households might alleviate the problem of child labor. For example, Basu (1999) hypothesizes that "...the availability of credit ... can rescue many from ...child labor, since in developing countries ...a typical reason for a child to drop out of school is ...a temporary mishap for the household, such as the father losing a job ..."[4]

Other studies that note an inverse relationship between access to credit and child labor include Jacoby (1994), which finds evidence in Peruvian data that children from poor households are more likely to withdraw from school as compared to children from more affluent households. Poor children are also more likely to withdraw at earlier points in time. Ranjan (2001) constructs an overlapping-generations model to demonstrate that child labor can arise in equilibrium when households are credit-constrained. Beegle et al. (2003) document the use of child labor by credit-constrained households experiencing transitory shocks to income (such as crop loss due to insects, rodents, and fire). Households with access to

[2]By demonstrating that the wage elasticity of child labor supply is negative, Bhalotra (2003) shows that income from child labor is required by the household to meet subsistence expenses.

[3]Jacoby & Skoufias (1997). p. 330.

[4]Basu (1999). p. 1108.

credit rely less on child labor. Edmonds and Pavcnik (2004) analyze the effect of easing credit constraints by studying Vietnam's global integration. Trade liberalization and the consequent increase in the price of rice and income of rice-producing households is associated with declines in child labor, as well as a rise in the percentage of girls attending school. Edmonds (2004) studies the social pension scheme in South Africa to conclude that child labor decreases and schooling increases when households become eligible for the pension.

The above studies suggest that easing credit-constraints may reduce the incidence of child labor. Implicit in this solution is that credit serves to finance consumption in bad times. However, credit plays another crucial role, which is to finance investment. It is therefore possible that under certain circumstances, increasing credit availability to poor households may exacerbate the problem of child labor rather than solve it.

Although the potential link between the investment role of credit and child labor is broadly acknowledged in the literature, relatively few studies have documented this fact. Mueller (1984) notes a positive correlation between household productive capital and child labor in rural Botswana. Bhalotra and Heady (2003) address the question of why schooling probabilities are low in land-rich households as compared to land-poor households. Using data from Ghana and Pakistan, the authors show that farm size has a positive effect on children's hours of work and a negative effect on the likelihood of attending school, particularly for girls. In explaining these results, they note that labor productivity increases with farm size (amount of land owned). Such dynamics are particularly strong if hired labor cannot be substituted for family labor due to moral hazard problems, if there are returns to experience from working the land (especially if children will inherit the land), or if labor-market inefficiencies imply that landowners face periodic shortages in hiring labor during seasons when demand is high. Wydick (1999) uses data from FUNDAP, a micro-lending program in Guatemala, to address the link between credit used to finance investments and

child labor. He finds that easing credit constraints may reduce investment in schooling if households are wary of hiring outside labor to work in the NFE due to moral hazard and other reasons, and/or if loans are obtained to augment capital assets of the household.

This paper extends existing research on the link between investment credit and children's schooling in two ways. First, these results substantiate the acknowledged positive association between operation of a family enterprise and child labor by showing that credit obtained for augmenting capital has no effect on the schooling probabilities of children who work in the home enterprise. Second, this study provides a possible explanation for decreases in the schooling probabilities of working children by demonstrating that investment loans increase the marginal product of labor of adults and children. Since increases in labor productivity imply increases in the opportunity cost of schooling, households that take investment loans may find it rational to keep their children employed in the home NFE.

3 Theoretical framework

This section lays out a theoretical foundation for the empirical work that follows. Each household consists of parents and a single child. For simplicity, let us consider a two period model in which the first period corresponds to the child phase, and the second period to the adult phase of the child in the household. A fraction of the child's time in the first period may be devoted to schooling, with the balance being spent working in the family enterprise. The adult phase involves only work in the family enterprise. The household derives utility from consumption in the two periods, and its utility function, $U(C_1, C_2)$, is assumed to be strictly concave and separable over C_1 and C_2.

Households obtain income from a non-farm enterprise (NFE) that they own; the house-

hold enterprise production function is given by:

$$y = f(K, H, G, L) \tag{1}$$

where y denotes income, K is the stock of physical capital, H is human capital, G is enterprise specific capital, and L is labor. In this model, we allow separate roles for enterprise specific capital and human capital. This allows us to capture the fact that children who work in the home NFE gain vocational training and on-the-job experience. Enterprise specific capital thus represents labor's skill and proficiency in working with physical capital. It therefore affects the marginal productivity of labor in a different way than human capital.

We will abstract from consumption credit in order to focus on the effects of investment credit on child labor. In the absence of consumption credit, consumption equals income in each period. Investment credit is available at an exogenously determined interest rate, r.

In the first period of the model, parents choose the amount of investment credit (ΔK) to borrow and the amount of their child's labor ($L^c \in [0, \bar{L}]$). In the second period, children become adults and work in the home enterprise. For simplicity, the fresh investment that is financed by investment credit is assumed to enter the productive capital stock of the household only in the second period.

The household's optimization problem can now be written as

$$\max_{L^c, \Delta K} \quad U(C_1, C_2) \text{ s. t.} \tag{2}$$

$$C_1 = y_1 = f(K_1, H_1, G_1, L^c + L) = f^1 \tag{3}$$

$$\begin{aligned} C_2 &= y_2 = f(K_1 + \Delta K, H_1 + \Delta H, G_1 + \Delta G, 2L) - \Delta K(1 + r) \\ &= f^2 - \Delta K(1 + r) \end{aligned} \tag{4}$$

y_1 and y_2 denote household income in the first and second periods, respectively. K_1, H_1,

and G_1 denote the household's endowment of physical capital, human capital, and enterprise specific capital, respectively, in the first period. L is the labor supplied by parents, thus $L^c + L$ is total household labor supply in the first period. ΔK, ΔH, and ΔG denote increments to physical capital, human capital, and enterprise specific capital, respectively, in the second period. Income in the second period is thus a function of the original stock of physical, human, and enterprise specific capital from the first period, and the increments to each of these. Human capital is accumulated through schooling, while enterprise specific capital is accumulated through work in the family enterprise.

Schooling enables the child to build human capital as follows:

$$\Delta H = e(t^e), \tag{5}$$

where $t^e = (\bar{L} - L^c)$ measures the amount of schooling. On the other hand, work in the family enterprise enables the child to build enterprise specific capital in the following way:

$$\Delta G = s(L^c) \tag{6}$$

Both $e(.)$ and $s(.)$ are assumed to be strictly concave increasing functions.

The first order condition (FOC) with respect to L^c is given by

$$\frac{dU(C_1, C_2)}{dL^c} = \frac{\partial U}{\partial C_1}\frac{\partial C_1}{\partial L^c} + \frac{\partial U}{\partial C_2}\frac{\partial C_2}{\partial L^c} \tag{7}$$

$$= \frac{\partial U}{\partial C_1}\frac{\partial f^1}{\partial L^c} + \frac{\partial U}{\partial C_2}\frac{\partial f^2}{\partial G}\frac{\partial s}{\partial L^c} - \frac{\partial U}{\partial C_2}\frac{\partial f^2}{\partial H}\frac{\partial e}{\partial t^e} = 0 \tag{8}$$

Let s' and e' denote $\frac{\partial s}{\partial L^c}$ and $\frac{\partial e}{\partial t^e}$ respectively. Focusing on those cases where there is an interior solution to the household's optimization problem with respect to L^c, we note that:

$$\frac{\partial f^2}{\partial G}s' - \frac{\partial f^2}{\partial H}e' = -\left(\frac{\partial U}{\partial C_1} * \frac{\partial f^1}{\partial L^c}\right) / \frac{\partial U}{\partial C_2} \tag{9}$$

Next, the household's first order condition with respect to ΔK is given by

$$\frac{dU(C_1, C_2)}{d\Delta K} = \frac{\partial U}{\partial C_1}\frac{\partial C_1}{\partial L^c}\frac{\partial L^c}{\partial \Delta K} + \frac{\partial U}{\partial C_2}\frac{\partial C_2}{\partial \Delta K} = 0,$$

which can be expanded to the following expression

$$\frac{\partial U}{\partial C_1}\frac{\partial C_1}{\partial L^c}\frac{\partial L^c}{\partial \Delta K} + \frac{\partial U}{\partial C_2}\left[\frac{\partial f^2}{\partial K} + \left(\frac{\partial f^2}{\partial G}s' - \frac{\partial f^2}{\partial H}e'\right)\frac{\partial L^c}{\partial \Delta K} - (1+r)\right] = 0 \tag{10}$$

Substituting (9) in (10), we get the household's FOC with respect to ΔK to be

$$\frac{\partial f^2}{\partial \Delta K} = (1+r) \tag{11}$$

Condition (11) makes the point that the household chooses the first-best level of investment. The child labor decision, thus does not affect the household's investment choice.

The two FOC's (9) and (11) together characterize the optimal behavior of households. In order to determine the relationship between investment and child labor that follows from this behavior, we differentiate both sides of (9) with respect to ΔK. This yields the following expression:

$$\begin{aligned}
&\left(\frac{\partial^2 U}{\partial C_1^2}\left(\frac{\partial f^1}{\partial L}\right)^2 + \frac{\partial U}{\partial C_1}\frac{\partial^2 f^1}{\partial L^2}\right)\frac{\partial L^c}{\partial \Delta K} \\
&+\frac{\partial^2 U}{\partial C_2^2}\left[\left(\frac{\partial f^2}{\partial G}s' - \frac{\partial f^2}{\partial H}e'\right)\frac{\partial L^c}{\partial \Delta K} + \frac{\partial f^2}{\partial K} - (1+r)\right]\left(\frac{\partial f^2}{\partial G}s' - \frac{\partial f^2}{\partial H}e'\right) \\
&+\frac{\partial U}{\partial C_2}\left(\frac{\partial^2 f^2}{\partial G \partial K}s' - \frac{\partial^2 f^2}{\partial H \partial K}e'\right) + \frac{\partial U}{\partial C_2}\left(\frac{\partial f^2}{\partial G}s'' + \frac{\partial f^2}{\partial H}e''\right)\frac{\partial L^c}{\partial \Delta K} = 0
\end{aligned}$$

where s'' and e'' denote $\frac{\partial s'}{\partial L^c}$ and $\frac{\partial e'}{\partial t^e}$, respectively. Substituting (11) in the above equation, and collecting terms, we get

$$\frac{\partial L^c}{\partial \Delta K}(\text{Negative terms}) + \frac{\partial U}{\partial C_2}\left(\frac{\partial^2 f^2}{\partial G \partial K}s' - \frac{\partial^2 f^2}{\partial H \partial K}e'\right) = 0 \tag{12}$$

From (12), it is seen that $\frac{\partial L^c}{\partial \Delta K}$ is positive or negative depending on the second cross-derivative terms $\frac{\partial^2 f^2}{\partial G \partial K}$ and $\frac{\partial^2 f^2}{\partial H \partial K}$, which denote the effect of investment on the marginal product of enterprise specific capital (MPG) and human capital (MPH), respectively. Intuitively, investment in physical capital increases the marginal product of both enterprise specific capital and human capital. But if the effect on MPG is higher than on MPH, then it is optimal for the household to complement investment with enterprise specific capital rather than human capital, thus inducing a shift away from schooling towards work in the family enterprise in the first period. This is also seen in (12), where $\frac{\partial L^c}{\partial \Delta K}$ is positive if $\left(\frac{\partial^2 f^2}{\partial G \partial K} s' - \frac{\partial^2 f^2}{\partial H \partial K} e'\right)$ is positive.[5]

The above model thus helps us understand the theoretical reasons why investment credit might lead to an increase in child labor. In the following sections, we address the empirical side of this issue.

4 Empirical model

4.1 Influence of credit on schooling

If access to credit implies that households do not need to withdraw their children from school to supplement family income, then total amount borrowed by the household should increase the probability of schooling (or at the very least, not reduce it). Since our dependent variable is a dummy indicating whether a child up to 14 years of age is currently enrolled

[5]The concavity of s' and e' might, however, impose limits on the extent to which child labor in the family enterprise increases with investment. At high levels of child labor, L^c, it is possible that $s' \ll e'$, and therefore, $\frac{\partial^2 f^2}{\partial G \partial K} s' - \frac{\partial^2 f^2}{\partial H \partial K} e'$ is negative even when $\frac{\partial^2 f^2}{\partial G \partial K} \gg \frac{\partial^2 f^2}{\partial H \partial K}$. In this case, investment credit will have a positive effect on child labor until a certain level of investment, beyond which it will have a negative effect.

in school, we use the following logit specification,

$$\ln\left(\frac{P_{ij}}{1-P_{ij}}\right) = \beta_1 + \beta_2\hat{c}_j + \beta_3 X_{1ij} + \beta_4 X_{2j} + \mu_{ij} \tag{13}$$

where P_{ij} is the probability that child i in household j is currently enrolled in school. Since credit may be endogenous (discussed below), we use the predicted value of credit obtained by the household $\hat{c}_j$, where $\hat{c}_j = \alpha z_k$. z_k is a set of exogenous instruments that is specific to households in community k (α is a vector of parameters that is estimated). These instruments (discussed below) affect credit, but conditional on credit, have no effect on the probability of current school enrollment. X_{1ij} and X_{2j} are other exogenous variables specific to child i and household j that influence schooling. The hypothesis that access to credit increases the likelihood of children's schooling is borne out if β_2 is positive and significantly different from zero.

The predicted value of credit, which is used as a right hand side variable in the maximum likelihood logit estimation of equation (13), is obtained from a first stage where credit is regressed on exogenous instruments. The use of an estimated variable in a non-linear specification may potentially lead to bias, but as discussed in Train et al. (1987), this bias is of second order and thus very small.[6] Furthermore, we obtain bootstrapped estimates to adjust the logit second stage standard errors for the use of a predicted variable from the first stage.

In order to study the effect of credit on the schooling probabilities of children who are currently employed in the household non-farm enterprise, we use a variant of equation (13).

[6] As in Wydick (1999), ordinary least squares (OLS) estimations of linear probability models were also conducted. Linear probability models are unbiased asymptotically, although they do not exhibit the minimum variance property. OLS estimations of linear probability models gave the same results as the logit models; these are not reported.

This model is as follows:

$$\ln\left(\frac{P_{ij}}{1-P_{ij}}\right) = \beta_1 + \beta_2\hat{c}_j + \beta_3 X_{1ij} + \beta_4 X_{2j} + \beta_5(\hat{c}_j * W_{ij}) + \beta_6 W_{ij} + \epsilon_{ij} \qquad (14)$$

where W_{ij} is a dummy variable that equals 1 if the child works in the family enterprise, and is 0 otherwise. For children who do not work in the family enterprise, the effect of credit on schooling is captured by the β_2 coefficient. As noted above, we expect β_2 to be positive. For children who work, the additional effect of credit on schooling is measured by β_5. If household borrowing to finance capital investments reduces the likelihood of schooling for employed children, then we expect β_5 to be negative. The *total* effect of credit on schooling for children who work is then measured by $(\beta_2+\beta_5)$. If $(\beta_2+\beta_5)$ is not significantly different from zero, then credit *has no effect* on the schooling probabilities of children employed in the home enterprise.

4.2 Influence of investment credit on labor productivity

An explanation for why investment credit has no effect on schooling hinges on credit's role in enhancing the productivity of all household members, including children. When credit is used to finance new physical capital, it increases the marginal product of labor, which includes raw labor and enterprise specific capital. Increased marginal productivity directly translates into higher opportunity cost of schooling, and thus, households that borrow to purchase new or additional capital equipment for use in the home enterprise may be less likely to send their children to school.

We estimate increases in labor productivity in two steps. Using the fact that the marginal product of labor is equal to the average product of labor multiplied by the elasticity of output with respect to labor (this is discussed in detail below), we first demonstrate that the elasticity does not depend on whether investment credit is obtained by the household. In order to accomplish this, we consider only those households that do not hire outside labor

to work in the home NFE (1371 out of 1657 households that operate NFEs), and use the daily average of log of (gross) cash value of sales of goods and services of the enterprise as our measure of output. Our measure of labor is the total number of hours worked per day in the NFE by adults and children in households that do not hire labor. Ideally, we would like to estimate increases in labor productivity of children alone. But doing so requires information on what part of sales of goods and services is exclusively due to children's labor. Unfortunately, we do not have this information.

Since credit may be endogenous, we use instrumental variables to estimate the following regression:

$$\ln Q = \gamma_1 + \gamma_2 \ln L^{hh} + \gamma_3 (\ln L^{hh} * D^{c_I}) + \gamma_4 X_{2j} + \nu_j \tag{15}$$

where Q is the cash value of sales from non-farm business, L^{hh} is the total number of hours worked per day in the non-farm enterprise by adults and children of the household, D^{c_I} is a dummy that indicates whether credit was obtained by the household for investment purposes, and X_{2j} are other variables that are household j specific. If the elasticity of output with respect to labor remains unchanged regardless of whether investment loans are obtained, then γ_3 will not be significantly different from zero.

If elasticities do not depend on investment credit, in order to show that marginal product of labor is higher in households that borrow for investment, it is sufficient to show that average product of labor increases for household members when investment loans are taken. In order to obtain the cleanest test, we again focus on only those NFE operating households that do not hire labor. Average productivity of labor is constructed by dividing the daily average value of cash from sale of goods and services of the business by the total number of hours worked per day in the enterprise by adults and children. Again, since credit may

be endogenous, we use instrumental variables to estimate the following:

$$\frac{Q}{L^{hh}} = \delta_1 + \delta_2 c_j^I + \delta_3 X_{2j} + \varepsilon_j \tag{16}$$

where variables are as defined above, and c_j^I is credit obtained to finance investments. If investment credit increases the average product of labor, then δ_2 will be positive and significantly different from zero.

5 Data

Data used in this research are from the Pakistan Integrated Household Survey (PIHS) carried out by the World Bank and the Government of Pakistan in 1991. The PIHS, a nationally representative survey, includes information on 300 communities, 4,794 households, and approximately 39,000 individuals. Because the survey provides detailed information on household characteristics, education, non-farm enterprise activities, and credit and savings, PIHS 1991 is particularly apt for purposes of this study.

Of the 4,792 households in the complete sample (2 households were dropped since information on weights was unavailable for them[7]), 1657 operate at least one non-farm enterprise. Of these, 656 households have taken a loan. On average, of the 656 households that operate at least one NFE and took a loan, about 45% (292 households) took loans for non-farm business reasons (purchase of inputs or working capital, purchase of land/buildings/equipment, or for other business expenses), 61% (399 households) took loans for capital reasons (purchase of farm inputs and other agricultural costs, in addition to non-farm business reasons mentioned above), and 47% (306 households) took loans for consumption (for consumption

[7]The PIHS sample was selected using a multi-stage stratified sampling procedure. Thus, all estimations as well as summary statistics are adjusted with weights to correct for the fact that the distribution of households in the sample is different from the distribution of households in the true population.

needs, for marriage/family events, or to purchase consumer durables). Households may take more than one loan at a time.

Summary statistics for the variables included in the estimations are provided in tables 1 and 2 (in the tables, "PSU" denotes primary sampling unit which can be thought of as the community from which the household is drawn; "HH" denotes household). Table 1 provides statistics for the sample of children less than or equal to 14 years of age. These variables are used in the estimations reported in tables 3-5. The dependent variable is a dummy for whether the child is currently enrolled in school, and as is evident from table 1, 54% of all children who ever attended school are currently enrolled. This number hides disparities in enrollment for male versus female children; boys have a higher enrollment of about 65% as compared to 43% for girls.

Table 1 shows that approximately 1% of all children in the sample work in the non-farm enterprise operated by the household. Of this 1%, the majority are boys with an NFE employment rate of 0.99%; very few girls (0.0058%) are employed in the home NFE. A larger 2.7% of children between the ages of 10-14 work in the NFE. Of this, the rate is 3.2% for boys and 2.1% for girls. In Pakistan, a large proportion of children work on the family farm, as well as for wages in agriculture (work on other farms) and non-agriculture (work for an individual or firm). We focus on children's employment in the home NFE in order to obtain the cleanest test of the productivity enhancing effects of investment credit. We expect that including children's work on the family farm (in response to the household obtaining loans to augment physical capital used on the farm) will strengthen our results.[8]

Of the 1% of all children who work in the family business, approximately 20% are in

[8]This is on our future research agenda.

school. Children who work and attend school spend approximately four hours per day working in the home enterprise. As expected, children who work and do not attend school spend a larger proportion of time working in the household business. Such children devote approximately seven hours per day (6.62 hours per day) to the home NFE. On average, all employed children spend approximately seven hours per day (6.72 hours per day) working in the family enterprise.

The average amount of credit taken by households in this sample is 16,850 rupees. Approximately 9% of these loans was taken for non-farm business reasons (purchase of inputs or working capital, purchase of land/buildings/equipment, or for other business expenses), and 22% was taken for all capital reasons (purchase of farm inputs and other agricultural costs, in addition to non-farm business reasons mentioned above). On average, households have taken approximately two loans.

Table 2 summarizes information for the complete sample of individuals and provides statistics for variables used in the estimations of tables 6 and 7. Most of the variables in table 2 are the same as those in table 1. Additionally, table 2 provides information on our measure of the average product of labor, and reports summary statistics for the log value of business assets used in the NFE and whether the NFE is a skilled occupation (handicrafts, wood/furniture making, textiles, and making leather products).

6 Results

6.1 Instruments

Credit may be endogenous primarily for two reasons. First, households that are more "able" or have more experience in managing borrowed funds may choose to participate in credit programs; this is the issue of self-selection. Second, some areas may have easier access to

credit as compared to other areas; this is the issue of omitted variables at the community level. The presence of either or both of these causes of endogeneity necessitates the use of instruments.

As noted in Pitt and Khandker (1998), a technique motivated by demand theory is to use the price of credit, or the costs associated with gaining access to and learning about credit, as identifying instruments for credit. The price of credit is the interest rate on the loan, and although the PIHS survey does collect this information, there are a large number of inconsistencies and missing values in the data. Alternatively, we hypothesize that the costs associated with gaining information on credit will be correlated with the level of infrastructural development in the community (PSU). Indicators of the presence of a railway station, a main bazaar (market), telephone and telegraph service, a police station, and natural gas (*sui*) connection for any household in the community are predictors of the information costs associated with learning about credit, but conditional on credit, these variables should have little effect on school enrollment. These variables thus form our set of instruments.

A discussion on the economic validity of these instruments is warranted. First, by proxying for ease of access to credit, instruments such as the presence of a railway line and presence of a telephone and telegraph service in the community should directly correct for a large part of the second cause of endogeneity noted above. However, since our instruments are measured at the community level, they have less power in predicting the within-community variation in credit. One way to allow for within-community variation would be to interact these instruments with variables measured at the household level. However, it is difficult to find household level variables which may be used as exclusion restrictions (that is, conditional on credit, have no effect on children's schooling). Thus for example, we could interact our instruments with education of the household head (to proxy for household "ability"),

but education of the household head should be present directly in the schooling equation as well. Given this, interactions of the community level variables with education of the household head would not have much power as instruments.[9] Hence, the set of instruments we use is composed of only community level indicators of the presence of a railway line, a main market, telephone and telegraph service, a police station, and a natural gas connection.

In this discussion on instruments, it is useful to note that Bhalotra and Heady (2003) study the positive effects of farm size on child labor with these same data (PIHS 1991). Their work uses the unemployment rate at the community level, presence of a railway station, presence of a market, and presence of electricity and piped water in the community as instruments for income.[10] Although income is not the same as credit, they are probably correlated since credit supplements income. Hence it is clear that we have precedence in earlier work based on these data for some of the instruments we employ. However, we use only two of the same instruments as Bhalotra and Heady (2003) since the remaining may be inappropriate from the perspective of our study. In particular, indicators of the presence of electricity and piped water could have independent effects on schooling over and above their effects through credit. For example, children in communities with electricity may have higher probabilities of enrollment because classrooms are well-lit.

In the first stage of our estimation, a linear specification is used to regress credit (total amount of household borrowing) on our set of instruments. The linear first stage explains approximately 20% of the variation in credit, and an F-test that these identifying instru-

[9]The basic regressions of table 3 below were estimated using such interactions as additional instruments. The effect of credit on schooling in the second column of table 3 did not improve.

[10]Interactions of these variables with education of the household head are used as well.

ments are jointly zero is strongly rejected (F[5,8878]=21.47, Prob > F = 0.0000). In order to ensure that our instruments have little effect on schooling conditional on credit, a logit model was used to regress the dummy for school enrollment on our set of instruments and the credit variable. Based on the point estimates from this regression, we cannot reject that the effect of our instruments is jointly zero. This means that conditional on credit, our instruments have little effect on the school enrollment dummy.

6.2 The effect of credit on schooling probabilities

Table 3 reports results for the basic regressions which are run on the sample of children for whom current schooling information is available. The first column does not correct for the endogeneity of the total amount borrowed by the household (credit). Credit has a positive but insignificant effect on the probability that a child up to 14 years of age is currently in school. Boys are significantly more likely to be in school, and education of the household head has a strong positive effect on children's current schooling. Table 3 also reports that older children in this age group are less likely to be in school.

Column (2) of table 3 reports results when credit is instrumented. As is clear, when the endogeneity of credit is taken into account, the effect of credit on schooling becomes significant and more than doubles in magnitude.[11] The coefficient increases to 0.164 from 0.051. This implies that for a thousand rupees (approximately 17 dollars) increase in the amount borrowed, the probability of schooling increases by about 1.78%.[12] This means that for a

[11]Column (2) of table 3 reports bootstrapped estimates of standard errors. This procedure is necessary to correct the standard errors for the fact that the predicted value of credit from the first stage is used as a right hand side variable in the second stage.

[12]More formally, for a thousand rupees increase in the amount borrowed, the odds of schooling increase by about 1.78%.

10% increase in loan size from the mean, schooling probabilities increase by about 2.9%. Additionally, wealth of the household as reflected in whether the household owns property, has positive effects on schooling. The effect of most of the other variables remains unchanged. The estimates in table 3 support the conventional hypothesis that credit has positive effects on children's schooling.

Table 4 reports results for the separate effects of (instrumented) credit borrowed for non-farm reasons, capital reasons, and for consumption, and the interaction of credit (borrowed for various reasons) with an indicator variable for whether a child up to 14 years of age works in the home NFE. As noted before, non-farm business reasons include purchase of inputs or working capital, purchase of land/buildings/equipment, and credit obtained for other business expenses. Capital reasons encompass non-farm business reasons and also include purchase of farm inputs and other agricultural costs. Consumption reasons include borrowing for consumption needs, for marriage/family events, or to purchase consumer durables. These estimations are run on the complete sample of children for whom current schooling information is available. The second and third columns of table 4 show that total borrowing for non-farm and capital reasons increases the probability that children are currently in school (the coefficient on credit ranges in magnitude from 0.17 to 0.31). On average, for a thousand rupees increase in the amount borrowed, the credit effects in columns (2) and (3) indicate that the odds of schooling increase by about 2.72%. This means that for a 10% increase in loan size from the mean, schooling probabilities increase by approximately 4.58%. As evident from column (3) of table 4, credit borrowed for consumption has no significant effect on schooling. The negative coefficients on the interaction terms in columns (1)-(3) of table 4 state that credit has a positive effect on schooling only for children who are not employed (the interaction terms are measured imprecisely). The third to last row of table 4 shows the sum of the coefficients on credit and the interaction term. The second to last row reports the p-values of a test that the sum of coefficients equals zero. In all

columns of table 4, we cannot reject the hypothesis that the sum of coefficients is equal to zero. That is, credit has no effect on schooling for children employed in the home NFE.

Consistent with the estimates of table 3, estimates in table 4 show that boys are more likely to attend school as compared to girls. Table 4 also shows that the household head's education level has strong positive effects on the dependent variable. Wealth, as measured by whether the household owns property, has the expected positive effects on schooling in column (1). Finally, age of the child has negative effects on schooling.

It is probable that children who work in the home NFE are somehow systematically different from those who do not work. In other words, the indicator variable for whether the child works in the home NFE is endogenous. We address this in the following way. Instead of interacting instrumented credit with a dummy for whether the child works in the home NFE, we interact credit with an indicator variable for whether the household operates a NFE. Since the indicator variable for whether the household operates a NFE may itself be endogenous, we instrument for its effects. Our instruments are the same as those we use for credit. In general, indicators such as presence of a railway line, presence of a market, and presence of a telephone and telegraph service are relatively good instruments, since they proxy for the level of infrastructure in the community which may be correlated to whether a household chooses to operate a home NFE. But conditional on whether the household operates a NFE, these variables in of themselves have little effect on schooling. The logit first stage explains approximately 24% of the variation in whether households operate a NFE, and the instruments are jointly significant at the 1% level.

Table 5 reports the results for various categories of credit, and their interactions with the instrumented value of whether households operate NFEs. As is evident, the interaction terms for credit in general (column (1)) and capital loans (column (3)) have the expected

negative sign, but are measured imprecisely. However, the p-values at the end of columns (1) and (3) indicate that we cannot reject the null that such loans have no effects on schooling probabilities. The interaction term for consumption credit is also negative (but measured with error), and the p-value in column (4) confirms that this type of credit again has little effect on schooling. These estimates support the results of table 4 by showing that although credit has some positive effects in households that do not operate NFEs (column (3)), in NFE operating households, credit has no effect on children's schooling.

Tables 4 and 5 present evidence that access to credit need not increase children's schooling, particularly if credit is obtained for investment purposes. Such results may reflect that credit, by increasing household physical capital, increases the marginal productivity of labor of adults and children who work in the home NFE. Tables 6 and 7 present evidence in support of this idea.

6.3 The effect of credit on labor productivity

In estimating increases in the marginal product of labor for members in households that borrow for financing investments, we follow Bardhan (1973). Bardhan (1973) notes that marginal product of labor equals average product of labor multiplied by elasticity of output with respect to labor input. Using cash from sale of goods and services of the NFE as the measure of gross output, and total hours worked by the different sets of workers as a measure of labor,[13] we show that marginal product of labor is higher for all members in households that borrow for capital and non-farm business reasons. If elasticity of output with respect to labor is constant across NFE operating households regardless of whether they took a loan, then in order to prove increased marginal product of labor in households

[13]We assume that child and adult labor is substitutable, although not necessarily one for one. Other studies that make a similar assumption include Basu and Van (1998) and Anker et al. (1998).

that took investment credit, it is sufficient to show that the average product of labor is higher in households that borrowed for investment reasons. As noted before, ideally, we would like to estimate increases in labor productivity for children alone. But doing so requires information on what part of daily sales of goods and services produced by the home NFE is exclusively due to children's labor. Unfortunately, we do not have this information. However, based on our estimates, we show that it is rational for households that take investment loans to employ their children in the family enterprise.

In order to ensure that our output measure (cash value of sales from the NFE) reflects the labor of household members only, we focus on households that do not hire labor to work in the family business. Of the 1657 households that operate an NFE, 1371 do not hire outside labor. These 1371 households form the sample for tables 6 and 7. Table 6 shows that elasticities are the same for households that borrow and those that do not borrow, regardless of the purpose for which the loan is obtained. Columns (1) and (3) report results for households where only adults work in the NFE. Columns (2) and (4) report results for households in which both adults and children work. From columns (1) to (4), hours worked by household members significantly increases cash revenues (the coefficients are measured imprecisely in columns (3) and (4)). The first two columns include a term that interacts log value of hours worked with a dummy for whether the loan was taken for non-farm business reasons. This interaction term is insignificant, indicating that elasticities are constant across households that borrowed for non-farm business reasons and those that did not borrow for this reason. The last two columns of table 6 include an interaction term for loans taken for capital reasons. Again, there is no evidence that elasticities change when capital loans are obtained.

Given the results of table 6, increased marginal product of labor in response to borrowing for investment purposes is evident if average product of labor is higher in households

that borrow for either non-farm or capital reasons. Table 7 shows that this is the case. Columns (1) and (3) report results for households where only adults work in the NFE. Columns (2) and (4) report results for households in which both adults and children work. The first two columns of table 7 indicate that credit borrowed for non-farm business reasons significantly increases the average product of labor of adults alone, and of adults and children. The last two columns report that credit obtained for capital reasons has a similar impact. Given constant elasticities, this implies that marginal product of labor of adults and children *increases* when households borrow for investment purposes. In particular, the larger coefficient on credit in column (2) (as compared to column (1)) and column (4) (as compared to column (3)) implies that it is rational for households that take investment loans to employ their children in the home enterprise. This is because with children's labor, the overall contribution to output is higher. However, without further knowledge on the possible complementarity of adult and children's labor when households borrow to finance investments, these estimates do not allow us to "back-out" the effect of investment loans on the productivity of children's labor alone. The ability to discern effects on children's labor productivity alone requires more information that we have available in our data. However, table 7 takes an important step in the right direction by providing evidence that the productivity of labor of all household members including children increases, when investment loans are obtained.

Tables 6 and 7 support the results of tables 4 and 5 by demonstrating that investment credit has little effect on schooling because this type of credit increases the labor productivity of all household members (including children) who work in the home enterprise. In the terminology of our theoretical model, we infer from these results that in our data, additions to physical capital (financed by investment credit) lead to greater returns to enterprise specific capital than human capital.

7 Conclusion

This paper studies the influence of credit on children's schooling probabilities using data from Pakistan. It shows that credit need not increase the likelihood of school attendance for children who work in their household's non-farm enterprise. We develop the intuition for this result using a simple two period theoretical model in which a household maximizes utility by choosing optimal amounts of investment credit and schooling. Child's schooling takes place in the first period (if at all), and the second period is spent working in the family business. If the child attends school in the first period, he builds human capital. If he works in the family enterprise in the first period, he builds enterprise specific capital. Investment credit increments physical capital, which raises the marginal product of both human and enterprise specific capital. If the latter effect dominates, then households will choose to complement additional physical capital with additional enterprise specific capital. For the child, this leads to more work in the home enterprise and less schooling. The predictions of our model are tested and confirmed using data on children from Pakistan. Our estimates indicate that loans taken to finance investments have no effect on the schooling of children who work in the family business. In the terminology of our theoretical model, we find that returns to enterprise specific capital outweigh the returns to human capital when households borrow to finance investments. We present evidence that the marginal productivity of labor of adults and children increases when investment loans are obtained. Our results suggest that by increasing productivity and thus the opportunity cost of schooling, investment loans may exacerbate the incidence of child labor in developing countries.

The aim of this study is not to argue that improved access to credit for poor households is unimportant. In fact, our estimates indicate that for a thousand rupees increase in the amount borrowed, the odds of schooling increase by about 1.78%. The purpose of this research is to demonstrate that improved credit access may not be *sufficient* to increase

schooling in developing countries. Schooling for children employed in the home NFE need not increase when investment loans are taken by NFE operating households. Although broadly acknowledged, this "wealth paradox of child labor" is documented in relatively few studies. Our research contributes to this literature by demonstrating that investment loans have little effect on schooling, and by providing empirical evidence that this may be because loans obtained to augment physical capital increase the labor productivity of all household members (including children) employed in the family business.

Child labor, even if confined to household production, is a social problem. The social gains from an educated citizenry may far exceed the private gains to an individual household from educating its children. Any solution to the problem of child labor must be evaluated against this background. If increasing access to credit markets shifts children's time towards more labor at the expense of education, it may be socially undesirable even when rational from the household's perspective. By discouraging investments in education, such dynamics may hinder prospects for long-term growth. The results of this research suggest that improving access to credit may not, by itself, constitute a solution to the problem of child labor. Along with improved access to credit, measures should also be implemented to ensure that credit availability does not increase child labor. For example, institutions providing credit to households for investment could explicitly monitor their use of child labor, and perhaps, require part-time schooling for children employed in the household's investment activity.

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Table 1: **Summary statistics for sample of children**

Variable	Mean	Std. Dev.	Min.	Max.	Obs.
Individual characteristics					
Dummy for currently in school[@]	0.543	0.276	0	1	6452
Dummy for child works in NFE	0.008	0.089	0	1	16131
Age of child in years	6.702	4.087	0	14	16131
Dummy for male child	0.509	0.500	0	1	16125
Household characteristics					
Credit related[‡]:					
Total amount borrowed by HH (x10^{-4})	1.685	5.885	0.1	605	8883
Total amount borrowed by HH (x10^{-4}) for non-farm reasons	0.646	3.747	0.1	60	8883
Total amount borrowed by HH (x10^{-4}) for capital reasons	1.245	5.776	0.1	605	8883
Total amount borrowed by HH (x10^{-4}) for consumption	0.692	2.645	0.1	67	8883
Dummy for non-farm loan	0.087	0.281	0	1	16131
Dummy for capital loan	0.221	0.415	0	1	16131
Dummy for consumption loan	0.277	0.448	0	1	16131
Other characteristics:					
Highest grade completed by HH head	3.080	4.078	0	21	16131
Dummy for male HH head	0.998	0.041	0	1	16131
Age of HH head	44.844	13.267	16	108	16131
Dummy for HH owning property	0.875	0.330	0	1	16028
Dummy for HHs that operate at least one NFE	0.624	0.484	0	1	10307
Total number of infants in HH	0.984	0.828	0	6	16131
Village characteristics					
Dummy for private hospital in PSU	0.939	0.239	0	1	16131
Dummy for family planning clinic in PSU	0.796	0.403	0	1	16131
Dummy for government hospital in PSU	0.911	0.285	0	1	16131
Number of public schools in PSU	7.234	1.303	1	8	16052
Dummy for paved road serving largest/central village in PSU	0.717	0.450	0	1	16131
Dummy for any HH connected to electricity in PSU	0.947	0.225	0	1	16037
Dummy for presence of railway line in PSU	0.998	0.043	0	1	16131
Dummy for presence of market in PSU	0.997	0.058	0	1	16131
Dummy for presence of telephone & telegraph service in PSU	0.992	0.088	0	1	16131
Dummy for presence of police station in PSU	0.972	0.164	0	1	16131
Dummy for presence of natural gas connection for any HH in PSU	0.156	0.363	0	1	16131

[@] Dependent variable. [‡] Endogenous variables.

Table 2: **Summary statistics for sample of all individuals**

Variable	Mean	Std. Dev.	Min.	Max.	Obs.
Individual characteristics					
Dummy for child currently in school[@]	0.236	0.500	0	1	15525
Dummy for child works in NFE	0.003	0.058	0	1	39120
Age of individual in years	21.129	19.451	0	108	39120
Dummy for male	0.518	0.500	0	1	36291
Household characteristics					
Credit related[‡]:					
Total amount borrowed by HH (x10^{-4})	1.827	7.725	0.1	605	20339
Total amnt. borrowed by HH (x10^{-4}) for non-farm reasons	0.651	3.694	0.1	60	20339
Total amount borrowed by HH (x10^{-4}) for capital reasons	1.350	7.641	0.1	605	20339
Total amount borrowed by HH (x10^{-4}) for consumption	0.739	2.810	0.1	67	20339
Dummy for non-farm loan	0.087	0.282	0	1	39120
Dummy for capital loan	0.208	0.406	0	1	39120
Dummy for consumption loan	0.257	0.437	0	1	39120
Dummy for non-farm loan taken by NFE operating HH	0.410	0.492	0	1	6024
Dummy for capital loan taken by NFE operating HH	0.601	0.490	0	1	6024
Dummy for consumption loan taken by NFE operating HH	0.473	0.499	0	1	6024
Other characteristics:					
Highest grade completed by HH head	3.186	4.216	0	21	39120
Dummy for male HH head	0.996	0.060	0	1	39120
Age of HH head	46.705	14.406	0	108	39120
Dummy for HH owning property	0.879	0.327	0	1	38850
Total number of dependents in HH	2.088	1.559	0	16	39120
Dummy for HHs that operate at least one NFE	0.609	0.488	0	1	26467
Cash from sale of g&s of business in last 14 days[@]	3905.461	10910.120	0	189250	21607
Cash from sale of g&s of business per day[@]	278.962	779.294	0	13517.86	21607
Number of hours worked in NFE by adults per day	4.770	8.065	0	66	39120
Number of hours worked in NFE by children per day	0.166	1.146	0	16	39120
Number of hours worked in NFE by adults & children p.d.	13.013	8.841	0	66	14822
Dummy for NFE is skilled occupation	0.055	0.229	0	1	39120
Log value of business assets used in NFE	8.580	2.292	0.693	16.590	14213
Average product of labor for adults & children per day[@]	26.424	62.465	0	821.429	11663
Village characteristics					
Dummy for private hospital in PSU	0.932	0.251	0	1	39120
Dummy for family planning clinic in PSU	0.796	0.403	0	1	39120
Dummy for government hospital in PSU	0.911	0.285	0	1	39120
Number of public schools in PSU	7.231	1.316	1	8	38954
Dummy for paved road serv. largest/central village in PSU	0.736	0.441	0	1	39120
Dummy for any HH connected to electricity in PSU	0.950	0.217	0	1	38938
Dummy for presence of railway line in PSU	0.998	0.044	0	1	39120
Dummy for presence of market in PSU	0.997	0.055	0	1	39120
Dummy for telephone & telegraph service in PSU	0.992	0.090	0	1	39120
Dummy for presence of police station in PSU	0.977	0.150	0	1	39120
Dummy for natural gas connection for any HH in PSU	0.180	0.384	0	1	39120

[@] Dependent variables. [‡] Endogenous variables.

Table 3: **Basic Regressions**

Logit estimation of factors affecting the probability of currently being enrolled in school for children up to 14 years of age. The dependent variable is 1 if the child is currently enrolled in school, 0 otherwise. Column (2) provides results when credit is instrumented (bootstrapped estimates are reported). Robust standard errors in parentheses. † indicates significance at 10%, * at 5%; ** at 1%.

Explanatory Variable	**Endogenous Credit (1)**	**Exogenous Credit (2)**
Total amount borrowed by HH (x10^{-4})	0.0506	
	(0.0516)	
Total amount borrowed by HH (x10^{-4}) instrumented		0.1635**
		(0.0597)
Total number of infants in household	-0.0929	0.0882
	(0.1648)	(0.1116)
Age of individual in years	-0.4588**	-0.4559**
	(0.0414)	(0.0336)
Dummy for male	0.7394**	0.6672**
	(0.1691)	(0.1294)
Highest grade completed by HH head	0.0646**	0.0811**
	(0.0221)	(0.0142)
Dummy for household owning property	0.2054	0.3443†
	(0.3007)	(0.2032)
Dummy for government hospital in PSU	-0.2772	0.3458
	(0.3135)	(0.2391)
Dummy for private hospital in PSU	0.3553	0.1978
	(0.3011)	(0.2498)
Dummy for family planning clinic in PSU	0.045	-0.1735
	(0.2651)	(0.2044)
Number of public schools in PSU	-0.1071	-0.0168
	(0.0802)	(0.0523)
Dummy for paved road serving largest/central village in PSU	0.286	0.0617
	(0.2136)	(0.1545)
Dummy for any household connected to electric power in PSU	0.0867	0.1077
	(0.3345)	(0.3048)
Constant	6.7522**	5.7827**
	(0.9220)	(0.6529)
Observations	3251	6372

Table 4: **Effect of instrumented credit with interactions**

Logit estimation of factors affecting the probability of current schooling for children (bootstrapped estimates are reported). The dependent variable is 1 if the child is currently in school, 0 otherwise. Robust standard errors in parentheses. † indicates significance at 10%, * at 5%; ** at 1%.

Explanatory Variable	**(1)**	**(2)**	**(3)**	**(4)**
Total amount borrowed by HH (x10^{-4}) instrumented	0.1821**			
	(0.0608)			
Total amount borrowed by HH (x10^{-4})	-0.4435			
instrumented*dummy for child working in home NFE	(0.3850)			
Total amount borrowed for non-farm reasons (x10^{-4})		0.3063†		
instrumented		(0.1678)		
Total amount borrowed for non-farm reasons (x10^{-4})		-0.1326		
instrumented*dummy for child working in home NFE		(0.4707)		
Total amount borrowed for capital reasons (x10^{-4})			0.1709†	
instrumented			(0.0960)	
Total amount borrowed for capital reasons (x10^{-4})			-0.1438	
instrumented*dummy for child working in home NFE			(1.2670)	
Total amount borrowed for consumption (x10^{-4})				-0.1249
instrumented				(0.0846)
Total amount borrowed for consumption (x10^{-4})				-0.1616
instrumented*dummy for child working in home NFE				(0.4077)
Dummy for child working in home NFE	-2.4109**	-2.8018**	-2.7879**	-2.8140**
	(0.5713)	(0.4430)	(0.3919)	(0.3911)
Total number of infants in household	0.0737	0.0578	0.0557	0.0566
	(0.1322)	(0.1323)	(0.1185)	(0.1167)
Age of individual in years	-0.4394**	-0.4374**	-0.4373**	-0.4386**
	(0.0329)	(0.0328)	(0.0346)	(0.0321)
Dummy for male	0.7458**	0.7268**	0.7277**	0.7210**
	(0.1301)	(0.1295)	(0.1236)	(0.1239)
Highest grade completed by HH head	0.0841**	0.0883**	0.0877**	0.0862**
	(0.0144)	(0.0144)	(0.0147)	(0.0143)
Dummy for household owning property	0.3411†	0.2496	0.2418	0.2367
	(0.1798)	(0.1773)	(0.1973)	(0.1841)
Dummy for government hospital in PSU	0.4093†	0.3859	0.378	0.3994†
	(0.2298)	(0.2347)	(0.2427)	(0.2381)
Dummy for private hospital in PSU	0.1599	0.0806	0.0771	0.0464
	(0.2385)	(0.2352)	(0.2387)	(0.2345)
Dummy for family planning clinic in PSU	-0.2009	-0.1756	-0.1811	-0.1706
	(0.2074)	(0.2085)	(0.1928)	(0.2119)
Number of public schools in PSU	-0.0434	-0.0443	-0.0446	-0.0462
	(0.0529)	(0.0534)	(0.0549)	(0.0535)
Dummy for paved road serving largest/central village	-0.0115	0.035	0.0341	0.0539
in PSU	(0.1588)	(0.1602)	(0.1634)	(0.1513)
Dummy for any household connected to electric power	0.239	0.2755	0.2854	0.2912
in PSU	(0.3001)	(0.2998)	(0.2809)	(0.2819)
Constant	5.7463**	5.9798**	5.9894**	6.0679**
	(0.6075)	(0.6029)	(0.6466)	(0.6415)
Sum of credit and interaction coefficients	-0.2614	0.1737	0.0270	-0.2864
p-value of test that credit+interaction coefficients = 0	0.4944	0.9999	0.9831	0.9998
Observations	6372	6372	6372	6372

Table 5: **Effect of credit in households that operate NFEs**

Logit estimation of factors affecting schooling (bootstrapped estimates are reported). Robust standard errors in parentheses. † significant at 10%, * at 5%; ** at 1%.

Explanatory Variable	**(1)**	**(2)**	**(3)**	**(4)**
Total amount borrowed by HH (x10^{-4}) instrumented	0.1423			
	(0.1311)			
Total amount borrowed by HH (x10^{-4}) instrumented*	-0.2061			
Dummy for home has NFE instrumented	(0.5451)			
Total amount borrowed by HH (x10^{-4}) instrumented -		0.2214		
for non-farm reasons		(0.1456)		
Total amount borrowed by HH (x10^{-4}) instrumented - for		0.3205		
non-farm reasons*dummy for home has NFE instrumented		(0.5822)		
Total amount borrowed by HH (x10^{-4}) instrumented -			0.1809†	
for capital reasons			(0.1094)	
Total amount borrowed by HH (x10^{-4}) instrumented - for			-0.2608	
capital reasons*dummy for home has NFE instrumented			(0.3957)	
Total amount borrowed by HH (x10^{-4}) instrumented -				-0.1769†
for consumption				(0.0907)
Total amount borrowed by HH (x10^{-4}) instrumented - for				-0.2448
consumption*dummy for home has NFE instrumented				(0.3710)
Dummy for home has NFE instrumented	0.0985	-0.4298*	-0.3543*	-0.4821**
	(0.4043)	(0.1689)	(0.1780)	(0.1747)
Total number of infants in household	0.0883	0.0816	0.0877	0.0932
	(0.1269)	(0.1280)	(0.1231)	(0.1224)
Age of individual in years	-0.4563**	-0.4554**	-0.4555**	-0.4573**
	(0.0316)	(0.0315)	(0.0305)	(0.0306)
Dummy for male	0.6681**	0.6702**	0.6717**	0.6722**
	(0.1295)	(0.1301)	(0.1209)	(0.1213)
Highest grade completed by HH head	0.0808**	0.0819**	0.0805**	0.0768**
	(0.0142)	(0.0141)	(0.0140)	(0.0140)
Dummy for household owning property	0.3480†	0.3308†	0.3270†	0.3333†
	(0.1789)	(0.1800)	(0.1777)	(0.1795)
Dummy for government hospital in PSU	0.3448	0.3443	0.3501	0.3641
	(0.2248)	(0.2245)	(0.2363)	(0.2394)
Dummy for private hospital in PSU	0.1973	0.1867	0.1814	0.1592
	(0.2337)	(0.2324)	(0.2609)	(0.2604)
Dummy for family planning clinic in PSU	-0.1742	-0.1534	-0.1746	-0.1614
	(0.2017)	(0.2020)	(0.2169)	(0.2167)
Number of public schools in PSU	-0.0143	-0.0138	-0.0133	-0.0171
	(0.0495)	(0.0496)	(0.0525)	(0.0531)
Dummy for paved road serving largest/central village in PSU	0.0752	0.0878	0.0957	0.0979
	(0.1499)	(0.1536)	(0.1576)	(0.1583)
Dummy for any household connected to electric power in PSU	0.0934	0.0911	0.0902	0.096
	(0.2917)	(0.2930)	(0.3028)	(0.3053)
Constant	5.7938**	6.1450**	6.1259**	6.3152**
	(0.6528)	(0.6185)	(0.6416)	(0.6629)
Sum of credit and interaction coefficients	-0.0638	0.5419	-0.0799	-0.4217
p-value of test that credit+interaction coefficients ~~3~~0	0.9179	0.3581	0.8465	0.2759
Observations	6372	6372	6372	6372

Table 6: **Elasticities when credit is obtained for various purposes**

Instrumental variables estimation of factors affecting log cash value of sales from non-farm business in last 14 days. These results are for households that do not hire labor. Robust standard errors in parenthesis. † indicates significance at 10%, * at 5%; ** at 1%.

Explanatory Variable	**(1)**	**(2)**	**(3)**	**(4)**
Log of total number of hours worked by adults in NFE per day	0.9439**		0.4288	
	(0.3402)		(0.4960)	
Log of total number of hours worked by adults and children in		0.8423*		0.6621
NFE per day		(0.3443)		(0.4157)
Log of total number of hours worked by adults in NFE p.d.*	-0.2455			
dum. for credit taken by NFE operating HH for non-farm reasons	(0.3723)			
Log of number of hours worked by adults & children in NFE p.d.*		-0.1193		
dum. for credit taken by NFE operating HH for non-farm reasons		(0.3650)		
Log of number of hours worked by adults in NFE per day*			0.3546	
dummy for credit taken by NFE operating HH for capital reasons			(0.5584)	
Log of number of hours worked by adults & children in NFE p.d.*				0.0812
dum. for credit taken by NFE operating HH for capital reasons				(0.4525)
Highest grade completed by HH head	0.0653**	0.0653**	0.0566*	0.0629**
	(0.0236)	(0.0215)	(0.0224)	(0.0206)
Age of HH head in years	-0.0115	-0.0108	-0.0073	-0.0096
	(0.0083)	(0.0079)	(0.0082)	(0.0078)
Dummy for male household head	2.0149**	1.7239**	2.3031**	1.6854**
	(0.4338)	(0.4597)	(0.8199)	(0.5367)
Total number of dependents in HH	-0.0642	-0.0496	-0.0586	-0.0459
	(0.0626)	(0.0586)	(0.0549)	(0.0557)
Dummy for household owning property	0.5864†	0.4441†	0.318	0.3484
	(0.3109)	(0.2680)	(0.4083)	(0.3489)
Log value of business assets used in non-farm enterprise	0.2219**	0.1974**	0.1326	0.1708*
	(0.0772)	(0.0689)	(0.0844)	(0.0672)
Dummy for NFE is skilled occupation	0.1093	0.0875	0.0476	0.0621
	(0.0740)	(0.0730)	(0.0609)	(0.0623)
Dummy for government hospital in PSU	0.032	0.0846	0.0075	0.0971
	(0.2882)	(0.2727)	(0.2889)	(0.2675)
Dummy for private hospital in PSU	-0.37	-0.4663	-0.7026	-0.5666†
	(0.3528)	(0.3275)	(0.4396)	(0.3435)
Dummy for family planning clinic in PSU	0.3519	0.3365†	0.2873	0.3191
	(0.2151)	(0.2034)	(0.1979)	(0.2004)
Number of public schools in PSU	0.045	0.0424	0.0032	0.031
	(0.0753)	(0.0685)	(0.0732)	(0.0687)
Dummy for paved road serving largest/central	0.3574	0.4144*	0.4195*	0.4558*
village in PSU	(0.2212)	(0.2096)	(0.2100)	(0.2236)
Dummy for any household connected to electric	-0.2528	-0.2298	-0.094	-0.1693
power in PSU	(0.4379)	(0.3981)	(0.2637)	(0.3180)
Constant	-5.6809**	-5.0303**	-4.2232**	-4.4678**
	(1.5658)	(1.4136)	(1.2377)	(1.1609)
Observations	3820	4041	3820	4041

Table 7: **Average Product of Labor**

Instrumental variables estimation of factors affecting average product of labor per day. Robust standard errors in parentheses. † indicates significance at 10%, * at 5%; ** at 1%.

Explanatory Variable	**Adults**	**Adults and Children**	**Adults**	**Adults and Children**
Total amount borrowed by HH (x10^{-4}) for non-farm reasons	20.3296†	23.9608†		
	(10.9006)	(12.7474)		
Total amount borrowed by HH (x10^{-4}) for capital reasons			11.7423†	13.1924*
			(6.0565)	(6.3906)
Highest grade completed by HH head	1.3833	1.834	0.5122	0.883
	(1.2788)	(1.3051)	(1.2951)	(1.2238)
Age of HH head in years	0.3088	0.3621	0.2624	0.2908
	(0.3333)	(0.3576)	(0.2438)	(0.2432)
Dummy for male household head	7.3998	-0.5925	37.7165**	30.9968*
	(20.8335)	(18.4253)	(13.9928)	(12.8935)
Total number of dependents in HH	-3.2899	-3.6236	-1.9087	-1.9788
	(4.1820)	(4.7986)	(2.9379)	(3.0369)
Dummy for household owning property	1.1852	-5.121	0.2676	-4.9689
	(6.8482)	(8.8053)	(6.8987)	(8.4464)
Log value of business assets used in NFE	-2.0797	-3.3338	-0.2718	-0.9124
	(2.0318)	(2.6184)	(1.6286)	(1.8011)
Dummy for NFE is skilled occupation	-7.6043	-8.4947	-3.0591	-3.2398
	(7.0666)	(7.2458)	(3.8858)	(3.5209)
Dummy for government hospital in PSU	8.0611	8.3065	2.1794	1.4745
	(9.7606)	(10.4304)	(7.3627)	(7.2824)
Dummy for private hospital in PSU	-3.527	-2.5559	-5.2679	-4.2837
	(18.1869)	(18.7407)	(13.9256)	(13.4977)
Dummy for family planning clinic in PSU	7.944	7.6987	6.3647	6.1674
	(8.2013)	(8.9574)	(5.9540)	(6.1669)
Number of public schools in PSU	-0.0782	-0.0616	-0.7162	-0.6098
	(3.8518)	(3.8013)	(2.7061)	(2.5873)
Dummy for paved road serving largest/central village in PSU	10.6017	11.4007	5.6814	6.0963
	(9.2723)	(9.7171)	(7.5119)	(7.2496)
Dummy for any household connected to electric power in PSU	-1.774	-2.8066	-3.3417	-4.2382
	(9.5262)	(10.6477)	(7.2209)	(7.2800)
Constant	-11.0534	5.9215	-33.2992	-21.0475
	(24.7799)	(28.9082)	(24.8143)	(26.3375)
Observations	5142	5501	5142	5501