SP DISCUSSION PAPER NO. 0125

Child Farm Labour: The Wealth Paradox

Sonia Bhalotra and
Christopher Heady

October 2001

Social Protection
LABOR MARKETS, PENSIONS, SOCIAL ASSISTANCE
THE WORLD BANK

Child Farm Labour: The Wealth Paradox

Sonia Bhalotra

Christopher Heady

October, 2001

Abstract

This paper is motivated by the observation that children in land-rich households are often more likely to be in work than the children of land-poor households. The vast majority of working children in developing countries are in agricultural work, predominantly on farms operated by their families. Land is the most important store of wealth in agrarian societies and it is typically distributed very unequally. These facts challenge the common presumption that child labour emerges from the poorest households. We suggest that this seeming paradox can be explained by failures of the markets for labour and land. Credit market failure will tend to weaken the force of this paradox. We model these effects and estimate the model on data from rural Pakistan and Ghana. A striking finding of the paper is that, after controlling for household consumption and other covariates, the wealth paradox persists for girls but, for boys in both countries, it vanishes.

Keywords: child labour, poverty, female education, agricultural households, Ghana, Pakistan
JEL Classification: J22, O15

Non-Technical Summary

The vast majority of working children in developing countries work on farms run by their own households. Children working for wages in export sectors (e.g. sports-goods and carpets) that have attracted public attention are a tiny fraction of the children that do not attend school. Popular discussions of adult minimum wage laws are more or less irrelevant to the question of addressing child farm labour since the adults in these households are typically self-employed. Similarly, trade sanctions are unlikely to have any effect on these children unless the agricultural produce is exported and is subject to sanctions[1]. In order to address the question of what policies might be most effective in addressing child *farm* labour, we need to understand its causes. We started by looking at child and household level data on farm labour in the two very different farming environments of Ghana and Pakistan. This yielded the remarkable observation that, on average, *the children of land-rich households are more likely to work and also less likely to be in school than the children of land-poor households.* Since land is the most important store of wealth in agrarian societies and a substantial fraction of households do not own land, this challenges the commonly held presumption that child labour emerges from the poorest households

What can explain the lower school attendance and greater work participation of larger land-owning households in both countries? We suggest that this seeming paradox can be explained by what economists would describe as "imperfections" in the markets for both labour and land. In the ideal world, land-owners would hire adult workers and send their children to school. However, in rural areas, labour needs are seasonal so there are times when lots of people have no work and other times when it can be hard to find workers, especially since labour mobility appears to be limited. This problem is reinforced by the fact that family members are easier to supervise than casual workers. So, if there is a big farm that needs labour, it can be very productive for the household to employ its children. Since the output generated by an additional worker is larger on a larger plot of land, the incentive to hire one's own children as farm labour is greater amongst large land-owners. There is therefore likely to be some land size up to which this incentive dominates the wealth effect of owning more land.

Is this bad for the child? This is unclear. It depends on the quality of the schools accessible to the child and the kinds of work available upon leaving school. These are weighed up against the rewards to working on the farm. These include not only the current increase in farm yield but also the value of the work experience gained by the child. This work experience is especially valuable for the children (especially the sons) of landowners, who can expect to inherit the farm. If land could quite easily be bought and sold, then the incentive to gain specific work experience would be weaker. An active land market would also tend to reduce the effects of the labour problems. In this sense, land market failure reinforces labour market failure. The theoretical literature on child labour has tended to emphasize credit market failure to the relative neglect of labour and land market failure. Credit market failure means that not everyone can borrow as much as they like and, in a rural society, households that can offer land as collateral are less likely to be credit-constrained than others. Thus, credit market failures actually weaken the force of the "wealth paradox".

---

[1] Whether the effect will be positive or negative is a further question.

We model these different effects in this paper and estimate the model on data from rural Pakistan and Ghana. A striking finding of the paper is that, after controlling for household consumption and other covariates of child labour, the wealth paradox persists for girls but, for boys in both countries, it vanishes. Although boys are more likely than girls to inherit land in the two countries studied, they also tend to get higher monetary rewards from their education than girls. The results in this paper seem to suggest that the rewards from education outweigh the rewards from work experience for boys. Moreover, since boys rather than girls traditionally look after their parents in their old age (except, possibly, amongst the *Akan* in Ghana) this may motivate parents to invest more in ensuring that they grow up to be rich.

Child Farm Labour :The Wealth Paradox

*Sonia Bhalotra and Chris Heady**

1. Introduction

This paper is motivated to explain the remarkable observation that, on average, the children of land-rich households are more likely to work and also less likely to be in school than the children of land-poor households. We observe this tendency in household survey data for rural areas of Ghana and Pakistan (Table 3, discussed in Section 4.3). Since land is the most important store of wealth in agrarian societies and a substantial fraction of households do not own land, this challenges the commonly held presumption that child labour emerges from the poorest households (e.g., US Department of Labor (2000), Basu and Van (1998)).

Child labour in export industries like carpets, garments and sports equipment has captured public attention and stirred a debate on trade sanctions and international labour standards (see Basu, 1999, for a survey). Yet obscured from the public eye, the vast majority of working children in developing countries are engaged in agricultural labour, predominantly on farms operated by their families (see ILO, 1996). The available theoretical and empirical literatures on child labour are not well-equipped to explain this. The theoretical literature on child labour has emphasised credit market imperfections (see Ranjan (1999), Lahiri and Jafarey (1999)) to the relative neglect of labour market imperfections. Indeed, a well-functioning labour market is central to the seminal paper on the economics of child labour by Basu and Van (1998). This paper emphasises that labour market failure may explain the paradoxical fact that the children of asset-rich households are often more likely to be in work and out of school than children in asset-poor households. We also argue that the effects of labour market imperfections are reinforced by ill-functioning land markets, whereas credit market failure creates an opposing effect.

---

*The authors are Sonia Bhalotra, University of Cambridge and University of Bristol (UK), Email: S.bhalotra@bristol.ac.uk and Christopher Heady OECD (Paris) and University of Bath (UK)
We are grateful to Fiona Coulter and Catherine Porter for excellent research assistance. This work was funded by the Economic and Social Research Council (grant number R000237121) and the Department for International Development as part of its Employment and Labour Markets Programme.

Ownership of productive assets such as land can influence child labour in the following ways. There is the standard wealth effect whereby large landholdings generate higher income and, thereby, make it easier for the household to forego the income that child work would bring. Capital market imperfections that result in lower interest rates for households that can offer land as collateral will reinforce the wealth effect, allowing large landowners to borrow more to fulfil insurance needs or to finance the child's education. Working against these effects is the fact that the marginal product of labour is greater the greater is the stock of productive assets. This raises the return to child labour and thereby encourages it. If labour markets were perfect and the landowning household could both hire in workers and monitor them effectively, then this incentive effect would disappear. There is also a reinforcing dynamic effect on marginal productivity that depends on the relative effectiveness of work experience and education in raising the future earnings of the child. This, in turn, depends upon the structure of inheritance norms and the degree of development of land markets. These different effects are specified in Section 3 in the context of a two-period model of child labour in a peasant household.

Motivated to separate the wealth effect from the other (substitution) effects of farm size, our empirical model departs from most other specifications in the literature by including both land size in acres and a measure of permanent income. While our data do not permit us to disentangle the labour market, credit market and inheritance (via experience/education) effects of farm size, separating the wealth effect is an important step forward. It permits analysis of the effects of income transfers versus land reform, for example. Our specification also improves upon existing work in controlling for alternative forms of land tenancy, and in instrumenting both of the key variables of interest: income and farm size.

The paper is organised as follows. Section 2 briefly surveys the relevant literature. Section 3 presents the theoretical model. Section 4 describes the data by gender and country. It presents the remarkable data on child work and school participation rates by land ownership. It also discusses relevant contextual features of Ghana and Pakistan. An empirical specification is discussed in Section 5. The results are presented in Section 6, and Section 7 concludes.

2. Relevant Literature and Contributions of this Paper

2.1. Modelling : Causes of Child Labour

As indicated in Section 1, the literature on child labour has not given much room to labour market failure. Basu and Van (1998) assume that subsistence poverty drives child labour and, in fact, the mechanics of the model depend upon a well-functioning labour market. Basu (2000) extends this analysis to consider the effects of an adult minimum wage on child labour. While these papers make an important contribution in (a) highlighting the role of poverty and (b) analysing the effects of policies that have recently been much discussed, these policies are of limited relevance to a majority of rural households whose main income derives from self-employment[2]. Other authors have emphasised that child labour can arise as a result of credit market constraints (Ranjan (1999), Lahiri and Jafarey (1999)) or the problems of inter-generational contracting (Baland and Robinson, 2000). Eswaran (2000) and Cigno and Rosati (2000) model child labour as codetermined with fertility.

2.2. Modelling: The Agricultural Household

The empirical fact that by far the majority of working children in developing countries work on household-run farms and enterprises motivates a focus on modelling the peasant household. In an early contribution, Rosenzweig and Wolpin (1985) use an overlapping generations model incorporating returns to specific experience to show that extended families, the cost advantages of family relative to hired labor, and the weakness of the land market may be manifestations of an optimal implicit contract between generations that maximizes the gains from farm-specific, experientially obtained knowledge. The canonical model of the consuming and producing agricultural household is now probably that of Strauss (1986). Benjamin (1992) extends this to show that if consumption and production decisions are separable then total labour usage on the household farm will be independent of household composition. However, if labour markets are imperfect, then separability is violated and farm labour usage is a function of household composition. In an interesting extension of this model, Cockburn (2000) shows that, in the non-separable case, child labour is a function of the stock of land and other

---

[2] On this, see Bhalotra (1999). There is the separate problem that minimum wage or other legislation is very difficult to enforce in a rural setting where the legal infrastructure is underdeveloped and the political infrastructure may be "captured" by powerful groups in society such as employers.

assets[3]. In an application to Ethiopia, Cockburn finds that some assets (e.g., livestock, land) increase child labour in Ethiopia while others reduce it (e.g., oxen, ploughs). He does not consider the other potential effects of ownership of productive assets and, in his empirical model, he does not condition on household income. The coefficient on the asset variable therefore compounds the income and substitution effects[4].

In this paper, we develop a theoretical model that clarifies the role of labour and land market failure as distinct from the role of credit market failure. Our model thereby integrates the different sorts of market failure in to one model and indicates the potential role of the phenomenon of interlocking factor markets in rural economies in understanding the "wealth paradox". Allowing two periods enables us to discuss the effects on future wages of the current decision on whether to work or attend school, and to relate these to land size via inheritance. The roles of inheritance and of the limitations of land markets appear not to have been discussed at all in the context of child labour. To the extent that inheritance laws favour sons over daughters, incorporation of this feature into a model of child labour holds the potential to explain the marked gender differentials in child labour and schooling that are evident in many developing countries.

2.3. Evidence: Studies of Child Labour

Early empirical work on child labour consisted largely of case studies that interviewed working children. Large scale representative household surveys have the advantage of providing information about children who do and do not work, thereby making it possible to investigate the decision to work. Since these large survey data have become widely available in the last decade, economists have estimated reduced form participation equations for child work and schooling for a range of countries[5]. This work has not been motivated to test any particular hypothesis but it has contributed to an increased understanding of the correlates of child labour.

Many of these studies include a measure of household income or consumption, the adult wage rate, or assets. The results are mixed, and this is not entirely surprising for the

---

[3] Bhalotra and Heady (1998), in an earlier version of this paper, presented a similar argument, describing the fact that land ownership will create both 'wealth' and 'wage' effects on child labour.

[4] Interpretation of Cockburn's results is further limited by the fact that he enters assets in terms of number of items (e.g. number of livestock) rather than in terms of their value. The fact that a cow is likely to be more valuable (or income-producing) than a plough is hence not allowed for.

[5] For example, see Canagarajah and Coulombe (1998), Grootaert and Patrinos (1998), Jensen and Nielsen (1997), Kassouf (1998), Patrinos and Psacharopoulos (1997), Ray (2000), Blunch and Verner (2000).

following reasons. The effects of productive assets on child labour will, as we have highlighted, tend to confound wealth and substitution effects. Moreover, most existing studies do not instrument household income and this will tend to create an upward bias in its coefficient[6]. In addition, available studies have tended to aggregate child work on the household farm or enterprise with work for outside employers and also with domestic work where the relevant data are available. It has also tended to pool data for rural and urban sectors of the economy and for boys and girls. If there are negative income effects in some sub-groups but not others, aggregation will tend to obscure them. In an analysis of adult labour in India, Rosenzweig (1980) presents formal models of labour supply, making and emphasising the distinction between landholding and landless rural households. This is, of course, relevant to child labour as well.

In order to identify the effects of living standards on child labour, our empirical specification addresses each of these three issues[7]. We include measures of both permanent income and size of landholding. Both of these variables are treated as potentially endogenous. A comparison of estimates with and without instrumental variables on our data underline the importance of IV. We estimate gender-specific models for each country, restricting our sample to children in rural areas who live in households that own or operate some land. Neglecting to select out the landless households would bias the coefficient on farm size. Indeed, our investigation of this showed that every other variable in the equation was wiped out by the stunning explanatory power of farm size when the equation was estimated on a sample including landless households. Finally, while existing work has tended to concentrate on the participation decision, we explain

---

[6] See, for example; Psacharopoulos (1997), Patrinos and Psacharopoulos (1997), Kassouf (1998), Canagarajah and Coulombe (1998), Kanbargi and Kulkarni (1995), Grootaert (1998), Blunch and Verner (2000). Grootaert (1998) acknowledges that income (or expenditure) is likely to be endogenous and argues that this is dealt with in his analysis of child labour in the Cote d'Ivoire by replacing income with a dummy for whether or not the household falls into the lowest income quantile. In fact, this dummy is of course endogenous as well- the author does not solve the problem by throwing away information on income. Ray (2000) also uses a dummy for whether the household is above or below a poverty line but he deducts the child's contribution to household income (using certain assumptions to impute a wage to unpaid child workers). This will not solve the endogeneity problem if child and parent labour supply are simultaneously determined. Bhalotra (2000b) finds evidence that parent and child labour supply are indeed jointly determined in rural Pakistan.

[7] Bhalotra (2000a) takes the bolder approach of arguing that the question of whether poverty compels child labour cannot be addressed by estimating the income effect on child labour since a negative effect would only indicate that child leisure (or schooling) is a normal good. This paper proposes that the sign of the wage elasticity of child hours of work provides the more evident test of the poverty hypothesis. It is estimated on data for children in wage work. This paper concentrates on the more prevalent farm work and the analytically distinct question of the wealth paradox.

hours of work. This is because data on hours of work of children exhibit substantial variation, with many children working less than 10 hours a week. From a policy perspective, participation at 10 hours a week is rather different from participation at 40 hours a week.

2.4. Evidence: Imperfections in the Rural Labour Market

Using data from the Peruvian Sierra, Jacoby (1993) shows that the marginal product in own-farm work (for adults) is not equal to the market wage, an indication of distortions in the labour market. Deolalikar and Vijverberg (1987) present evidence that family and hired labour are not perfect substitutes. For example, family members may be easier to supervise than casual workers. Direct evidence of moral hazard in the rural labour market is found in Foster and Rosenzweig (1994). These observations are reinforced by the limited extent to which the wage labour market has developed in rural areas of Ghana and Pakistan (see Section 4.2), although it is growing. Moreover, labour needs in rural areas are seasonal, so there are times when lots of people have no work and other times when it can be hard to find workers. So, while in the ideal world, land-owners would hire adult workers to till their farms and send their children to school, in reality incentives and constraints may combine to make them employ their own children.

3. A Two-Period Model of Child Labour

This section develops a model of the peasant household in an economy with imperfect markets for labour, land and credit. Allowing two periods, we are able to capture the impact of child work in period 1 on productivity in period 2. This arises through both the gain in work experience and the possible lowering of educational attainment. The model specifies the effects of farm size on child labour which, in addition to a wealth effect, include substitution effects arising on account of market imperfections. Separating the substitution and wealth effects has policy relevance. For example, the relative efficacy of land reform and income transfers in reducing child labour will depend upon the relative size of these effects. Our model shows that this will hinge not only on preferences and the long run net returns to work experience and education, but also on whether the effective choice is between work and school or between one of these

activities and leisure, as well as upon the extent of labour market failure relative to credit market failure[8].

3.1. Model Specification

Consider a peasant household containing parents and children which has no access to a labour market. Divide its life span into two periods. In the first, the parents produce output on the farm using land, their own labour and possibly their children's labour. During this first period, the children may also attend school. In the second period, the children have grown up and may even have left the family home, but the household continues to value their consumption as part of the household's total.

In the first period, superscripted 1, household income is given by a farm production function:

$$Y^1 = F^1(A, L_p^1, L_c^1) \qquad (1)$$

where A is land area and L is labour, with the subscripts p and c differentiating between labour supplied by parents and children. It is analytically convenient to assume that these households neither buy nor sell labour but if, in fact, the household can trade on the labour market, their net income will still depend on the variables included in F^1. In such a case, this function can be re-interpreted as a net income function and the analysis below is unchanged. Only if the labour market were perfectly competitive would the results below change fundamentally. However, we have argued in Section 2.4 that this is unlikely. In the second period, the children may have left home and their contribution to family income is separate from household farm production. Household income is then given by:

$$Y^2 = F^2(A, L_p^2) + W_c^2(S, L_c^1).L_c^2 \qquad (2)$$

where we have allowed the child's wage in the second period to be a function of her first period labour supply.(L_c^1) and schooling (S). W does not have to be an explicit wage: if the child grows up to work on her own farm, W is her marginal product.

---

[8] In the interests of simplicity, the model presentation suppresses the important distinction between boys and girls as well as a number of other influences on child labour. These factors are, however, included in the estimated model. .

The household utility function is separable between the two periods:

$$U = U^1(X^1, L_p^1, L_c^1, S) + U^2(X^2, L_p^2, L_c^2) \qquad (3)$$

where X is consumption. We assume that children under 15 do not bargain with their parents. Their only fallback option may be to run away from home and this may be thought especially unlikely among land-owning households since children may expect to inherit the land if they remain attached to the household. It may be important to allow the child labour decision to be influenced by the relative bargaining powers of the mother and the father of the child (e.g. Galasso, 1999). Although our data do not have variables such as individual assets ("extra environmental parameters"- see McElroy, 1990) that can be used to denote these relative powers in an empirical model, we include an indicator for female headship and measures of the education of the mother and father and expect that these will capture the relative power of women in decision-making.

The household inherits some (positive or negative) financial wealth from a period zero that is not modelled. Call this K^0. Then financial wealth in period 1, K^1, is given by:

$$K^1 = K^0 + F^1(A, L_p^1, L_c^1) - X^1 - C(S) \qquad (4)$$

where C(S) is the cost of schooling and the price of consumption is normalised to unity. The financial wealth available to the household in period 2 will depend on that in period 1, but will also depend on the household's access to financial services. Under *imperfect capital markets*, the interest rate facing the household will depend upon its wealth. For households with negative financial wealth (debt), the interest rate will additionally depend on characteristics that affect their perceived credit-worthiness including personal characteristics (Z) and ownership of land (A). Indeed, Swain (2001) finds striking evidence of this in the Puri district of Orissa in India, where both access to loans and the interest rate paid are a function of land owned. Let us represent this relationship between wealth in the two periods by the function $K^2 = G(K^1, A; Z)$. This implies the following budget constraint for period 2:

$$X^2 = F^2(A, L_p^2) + W_c^2(S, L_c^1).L_c^2 + G(K^1, A; Z) \qquad (5)$$

The household attempts to maximise (3) subject to (4) and (5).

3.2. The First-Order Conditions

The first-order conditions most relevant to the child labour decision are as follows:

$$\frac{\partial U^1}{\partial X^1} - \lambda^1 = 0 \tag{6}$$

$$\frac{\partial G}{\partial K^1}\lambda^2 - \lambda^1 = 0 \tag{7}$$

$$\frac{\partial U^1}{\partial L_c^1} + \frac{\partial F^1}{\partial L_c^1}\lambda^1 + \lambda^2 . \frac{\partial W_c^2}{\partial L_c^1} L_c^2 \leq 0 \tag{8}$$

$$\frac{\partial U^1}{\partial S} - \frac{dC}{dS}\lambda^1 + \lambda^2 . \frac{\partial W_c^2}{\partial S} L_c^2 \leq 0 \tag{9}$$

where λ_1 and λ_2 are the Lagrange multipliers on (4) and (5), and the inequalities in (8) and (9) become equalities when child labour and schooling, respectively, are positive. The work-leisure choice is made with reference to equation (8). This states that the value of the marginal product of child labour in the first period plus the value of the wage increase in the second period (arising from work experience) must be less than or equal to the marginal (dis)utility of work. Equation (9) has a similar interpretation for the choice between leisure and school attendance. Combining (8) and (9) gives:

$$\{\frac{\partial U^1}{\partial L_c^1} - \frac{\partial U^1}{\partial S}\} + \lambda^1 . \{\frac{\partial F^1}{\partial L_c^1} + \frac{dC}{dS}\} = \lambda^2 . L_c^2 . \{\frac{\partial W_c^2}{\partial S} - \frac{\partial W_c^2}{\partial L_c^1}\} \tag{10}$$

which is the relevant condition if hours of child leisure are fixed and one is interested in the *reallocation of an hour of child time from work to school.* Note that child labour supply in period 1 will be zero if (8) is satisfied by an inequality when evaluated at zero

hours. This would be equivalent to the implicit wage being below the reservation wage. Thus, a tobit model is used to take account of the fact that the left-hand side variable is constrained to be non-negative.

3.3. The Estimated Equation

The choice variables can be expressed as functions of the exogenous variables, land size (A) and initial wealth (K^0). Substituting out the terms in condition (8) and solving gives us an expression for the quantity of interest, namely the quantity of child labour supplied in period 1:

$$L_c^1 = H(A, K^0; Z, e) \tag{11}$$

where Z is a vector of observable household characteristics that affect the objectives and constraints of the optimisation problem. Unobservable characteristics and optimisation errors are captured by the random variable, *e*. Equation (11) cannot be estimated directly because initial financial wealth, K_0, is unobservable. This difficulty is dealt with by noting that consumption in period 1 is also a choice variable, and therefore a function of all the variables on the right-hand side of (10). This function can be inverted to give:

$$K^0 = K(A, X^1; Z, e) \tag{12}$$

It is then possible to substitute (12) into (11), to obtain:

$$L_c^1 = H'(A, X^1; Z, e) \tag{13}$$

It is this equation that we estimate.

3.4. Farm Size : Substitution and Wealth Effects

Interpretation of the parameter estimates of (13) requires an understanding of how the estimated coefficients relate to standard concepts in the theories of labour supply and

household decision-making[9]. This is best achieved by analysing the Hicksian supply function for child labour that follows from the household maximisation problem:

$$L_c^1 = L_c^1(w_c^1, v, h, r, U; Z, e) \tag{14}$$

where w_c^1 is the implicit wage for child labour in period 1, obtained by partially differentiating the production (or net income) function, v is the marginal effect of work experience on the second period wage, h is the marginal effect of schooling on the second period wage, r is the (marginal) interest rate implied by the function G, and U is utility. The second period child wage does not appear in (14) because it is endogenous, determined by v and h via the effect that they have on the allocation of child time. Parents' wages do not appear because we assume that child labour is separable from parent labour or that parents' labour supply has only income effects on child labour supply[10].

Differentiation of the labour supply function in (14) gives:

$$\delta L_c^1 = \frac{\partial L_c^1}{\partial w_c^1}.\delta w_c^1 + \frac{\partial L_c^1}{\partial v}.\delta v + \frac{\partial L_c^1}{\partial h}.\delta h + \frac{\partial L_c^1}{\partial r}.\delta r + \frac{\partial L_c^1}{\partial U}.\delta U \tag{15}$$

The last tem in (15) is a wealth effect. The first four terms on the right-hand side are substitution effects which, as we shall see, arise on account of various market failures.

Consider how changes in land holdings (A) influence these five terms, and hence the supply of child labour. (i) An increase in the land-labour ratio will increase the marginal productivity of labour (higher implicit wage)[11]. If labour markets are imperfect and it is difficult to hire in workers, then this will encourage child work on the household farm. This is reflected in the first term on the right of (15) being positive. Under perfect labour markets, this effect would be zero. (ii) An increase in land owned will lower the

---

[9] Several empirical studies of child labour include one or both of these variables but, typically, with no attempt at interpreting their coefficients in the context of a theoretical model.

[10] This assumption is investigated in Bhalotra (2000b) using the same data source for rural Pakistan and distinguishing wage work and work on household farms and enterprises.

[11] Household size and composition are held constant through Z. Thus an increase in land is an increase in the land-labour ratio.

effective interest rate faced by households because of the value of land as collateral. This effect is reflected as a negative sign on the fourth term on the right of (15) and it would be zero if capital markets were perfect as interest rates would then be independent of household wealth.

The effects of land holdings on the second and third terms on the right-hand side of (15) will depend on whether land is inherited and how active a land market there is. For children who do not expect to inherit the family farm or who can expect to sell it when they grow up, the effect of schooling or work experience on their adult wages will be independent of the size of the farm of their childhood. (iii) However, for children who do inherit the family farm, the importance of agricultural skills (as measured by the absolute increase in income earned by increased skills) will be greater the larger the farm. In this case, v is increasing in A, and the second term on the right hand side of (15) is positive. (iv) If schooling also increases agricultural skills, h is increasing in A, resulting in a negative sign on the third term in (15). The evidence of positive schooling effects on agricultural productivity is mixed and may be expected to depend, amongst other things, upon the degree of technological change and dynamism in agriculture (Rosenzweig, 1995)[12]. It is common knowledge that land markets are weak in most rural economies (see Rosenzweig and Wolpin, 1985, for example), and Swain (2001) presents some recent evidence from India. We do not have information on which children stand to inherit the farm but, to the extent that boys are more likely to inherit than girls, these substitution effects will be larger for boys. Since the effects associated with v and h take opposing signs, whether their joint effect makes the land-size coefficient more or less positive for boys as compared with girls is an empirical question.

The final term in (15) will be negative because higher permanent income, *ceteris paribus*, is expected to reduce child labour supply. We have so far considered the effects of changes in land size on child labour. In fact, there will be effects of land size on the amount of labour performed by parents. Under our assumption of weak separability between parent and child labour supply, these effects are captured by the permanent income (consumption) variable in the empirical model.

---

[12] Bekombo (1981), for instance, emphasises the importance of work experience for children in rural Africa. Weir and Knight (2000) present evidence that educated farmers are both early innovators and more likely than the less educated to adopt available methods.

If households have sources of financial wealth other than land, then cross-sectional differences in consumption will reflect differences in total wealth rather than just differences in land ownership. This will not affect any of the substitution terms in equation (15), and will only have an income effect. This income effect in the model comes through the shadow prices, λ^1 and λ^2, with a high price being associated with a low level of permanent income. Under perfect capital markets, lower income will create an equal proportionate increase in λ^1 and λ^2 (see equation (7)). It follows from (8) that this will result in an increase in child work. This negative income effect is unambiguous because we assume that the marginal utility of labour is negative. In (10), where leisure is fixed and the effective choice is between work and school, there is no income effect if the marginal utilities of work and school are the same. A negative income effect in this case depends upon the (plausible) assumption that work is more unpleasant at the margin than school ($\partial U^1/\partial L_c^1 - \partial U^1/\partial S < 0$).

Credit constraints will reinforce the negative income effect on child work for perfect capital markets. This is because low-income households are more likely to face credit constraints A sudden reduction in a household's finances will increase the current period's shadow price, λ^1, without a corresponding increase in the shadow price for period 2, λ^2, resulting in an increase in child work in the current period. (The vector Z therefore includes variables that capture the economic vulnerability of the household (Section 5.).

Thus, controlling for current-period consumption in addition to farm size offers the following advantages. (1) It allows for income effects on child labour arising from sources of wealth other than land. (2) It allows us to interpret the farm size coefficient as the net result of different substitution effects. Without consumption held constant, this coefficient would combine income and substitution effects. (3) Investigating the effect of household poverty on child labour is of direct interest.

4. Data and Descriptive Statistics

The data are drawn from the Ghana Living Standards Survey (GLSS) for 1991/2 and the Pakistan Integrated Household Survey (PIHS) for 1991. These are large nationally representative surveys collected by the respective national governments in cooperation with the World Bank. We select the rural sample of each survey. The GLSS collects data on employment for persons 7 years or older whereas the cut-off is at the age

of 10 in the PIHS. The structure and coverage of the two data sets is sufficiently similar to allow some interesting cross-national comparisons.

4.1. Activity Rates and Hours of Work

This section refers to Tables 1 and 2, which profile participation rates and hours in work and school for 7-14 year olds in Ghana and 10-14 year olds in Pakistan. In Ghana, 1% of boys and 34% of girls undertake work on the household farm. In Pakistan, the corresponding participation rates are 22% and 28%[13]. Farm work is, on average, a half-time job for children. There is wide dispersion in work hours around the mean, which underlines the importance of explaining hours and not just work participation. The question of whether child labour is a "bad thing" or whether some farm work may just be good exercise and practical training depends upon the hours spent in such work and the extent to which it conflicts with school[14].

Of Ghanaian children who work on the household farm, three in four boys and two in three girls are at the same time in school. In Pakistan, this is true of one in two boys. Girls in Pakistan are in a class apart, as only one in ten of those who work on the farm attends school. It would appear, therefore, that combining farmwork and school is considerably easier in Ghana than in Pakistan and that it is especially difficult (or not preferred) for Pakistani girls.[15] Heady (1999) finds that working affects school performance in Ghana, even though it does not affect school attendance. This is not surprising since the hours of work involved are not trivial. We do not have the data required to investigate school performance in Pakistan.

A striking difference between the two countries is that a significant fraction of children in Pakistan are engaged in work outside the household, whereas child

---

[13] For all types of work except housework, this refers to the answer to the question : "how many hours per week did you normally work?" Only 5 children reported working at more than one occupation at the same time, so secondary work was ignored in the interests of simplicity. Individuals may be engaged in housework as well as the main occupation.

[14] Cigno, Rosati and Tzannatos (1999), for example, find no difference in the health status of working children and school-going children in India and they find that children that are neither in work nor in school are the least healthy.

[15] The correlation of school attendance (a binary variable for the individual) with work-participation and hours of work was examined for 7-17 year olds, holding constant age, household size, current household expenditure per capita, and all cluster-specific effects. The conditional correlation of work participation with school participation in Ghana is (unexpectedly) positive but increasing hours of work did appear to reduce the probability of school attendance. In Pakistan, both participation and hours of child work are negatively correlated with school attendance (results available from the authors).

participation in wage work in Ghana is close to zero. School attendance in Pakistan shows a remarkable gender differential, much greater than that in Ghana. In both countries, a substantial proportion of children neither work nor go to school and this fraction is especially large among girls. Therefore, if the main concern is with low educational attainment (and the gender gap therein), then policies designed to discourage child labour may be rather less important than policies that directly promote school attendance (Ravallion and Wodon (2000) find support for this for the case of Bangladesh).

4.2. Land Scarcity, Land Use and Poverty

Ghana and Pakistan pose some interesting contrasts. There is greater land scarcity in Pakistan than in Ghana. Likely related to this, the wage labour market is better developed in Pakistan than in rural Ghana (e.g. 36% of adult men work for wages in rural Pakistan and only 22% in rural Ghana). These facts suggest both a higher marginal productivity of child labour, and greater difficulty in hiring-in adult labour in Ghana, and they therefore lead us to expect more children to be employed on household farms in Ghana than in Pakistan. This, as we have seen, is born out by the data (Table 1). However, this does not imply that children are better off in Pakistan. Compared with other developing countries, Pakistan has a relatively high rate of child wage employment- about 10% of 10-14 year-olds. Moreover, children in Ghana are better able to combine farm work and school attendance than are children in Pakistan (Table 1). Our data show that households that send children in to wage work are poorer on average than households that employ children on the family farm. Overall, there is a higher incidence of poverty in Pakistan as compared with Ghana (Ray (2000) estimates that 27% of households in Pakistan fall below the median income per adult-equivalent as compared with 14% in Ghana). The two countries also exhibit very different patterns of land use. It is much more common in Ghana than in Pakistan for a household to operate land that is not owned. Also, a given household in Ghana may have more than one plot of land, with ownership divided even between husbands and wives- this is uncommon in Pakistan. Finally, the data in Tables 1-3 indicate a much wider gender gap in child labour in Pakistan than in Ghana.

Table 1: Child Activities

	Pakistan Boys	Pakistan Girls	Ghana Boys	Ghana Girls
Total Participation Rates				
Household Farm work	22.1%	28.1%	40.5%	34.4%
Household Enterprise work	2.3%	1.6%	1.8%	2.5%
Wage work	6.2%	11.9%	0%	0%
School	72.8%	30.5%	76.5%	68.9%
None of the above activities	14.0%	42.4%	12.7%	20.1%
Domestic work	n.a.	99.4%	89.8%	96.2%
Participation In One Activity				
Farm work only	8.6%	21.1%	10.6%	9.8%
Enterprise work only	0.64%	1.2%	0.3%	1.2%
Wage work only	3.2%	6.8%	0%	0%
School only	61.3%	27.6%	45.0%	43.3%
Work Combinations				
Farm & enterprise work	0.91%	0.09%	0%	0%
Hh farm & wage work	2.1%	4.1%	0%	0%
Hh enterprise & wage work	0.25%	0.27%	0%	0%
Work & School				
Farm work & school	10.5%	2.7%	29.9%	24.6%
Enterprise work & school	0.50%	0%	1.5%	1.3%
Wage work & school	0.74%	0.73%	0%	0%
Number of children	1209	1096	1718	1542

Notes: Rural areas. Ghana: 7-14 year-olds, Pakistan: 10-14 year-olds.

Table 2: Weekly Hours of Child Farm Work

	Household farm	Wage work
Ghana boys	15.5 (13.3) N=696	
Ghana girls	15.4 (12.9) N=531	
Pakistan boys	22.5 (18.5) N=267	44.9 (22.3) N=61
Pakistan girls	13.3 (13.8) N=308	30.9 (15.6) N=73

Notes: Hours are values reported for the reference week, conditional on participation in the activity in the reference week. Figures in parentheses are standard deviations around the means. N is the number of working children. For Ghana the data refer to 7-14 year olds and for Pakistan to 10-14 year olds.

4.3. The Wealth Paradox

As this is the focus of the current paper, Table 3a presents the data on child work (farm work as well as total work) and school participation by land ownership (0/1) and size of land owned. Let us first **compare households that own no land with households that own some.** In Pakistan, where 33% own land, the probability of both all-work and farm work in Pakistan is substantially higher amongst landowners than amongst the landless! This is reflected in the school attendance rates of *girls* being higher in landless households. However, in the case of *boys*, the wealth effect appears to dominate and school attendance is higher amongst the landed. In Ghana, where 44% of households own land, the patterns conform to expectation with the children of landowning households

Table 3a: Participation Rates by Land Owned

Land Group	%H	School		Farm work		All work	
		Boys	Girls	Boys	Girls	Boys	Girls
PAKISTAN							
Own Land=1	33	76.7	27.6	31.0	36.4	33.0	43.9
Own Land=0	67	70.7	32.7	17.0	22.9	24.4	32.9
Marginal	9	77.8	24.6	29.1	36.5	31.6	47.8
Small	12	73.0	26.7	34.1	38.0	36.6	44.0
Large	9	79.1	29.6	31.1	36.5	31.8	39.7
GHANA							
Own Land=1	44	81.9	75.7	49.7	46.8	52.9	50.5
Own Land=0	56	73.5	66.7	55.6	48.8	57.6	51.4
Marginal	12	80.3	76.6	44.3	43.9	47.5	47.7
Small	19	83.7	79.7	45.9	47.1	50.7	51.2
Large	13	80.5	69.7	58.5	48.5	59.7	51.5

Notes: In column 2, %H refers to the % of households that fall into the category indicated in column 1. 1 hectare (h)= 2.7 acres. Land size is grouped as follows: *Marginal* is <1h, *Small* is 1-3h, *Large* is ≥3h. This is the classification used by the Indian census and we have adopted it after checking that it is a useful categorisation for the Pakistan and Ghana data sets. *All work* refers to participation in any of three activities: work on household farms, work on household enterprises, and work on the wage labour market. It is not the inverse of school attendance because there are children who are neither in work nor in school (see Section 4.1).

being more likely to be in school and less likely to be in work than the landless, although the difference in probabilities is rather smaller than one might have expected.

Now condition on ownership and consider **size of land owned** (marginal, small and large farmers, percentages of each shown in column 2 of Table 3a), to allow for likely non-linearities arising from the sizes of both the wealth and the substitution effects being a function of land-size. Now the wealth paradox is apparent in both countries. In Pakistan, there is an evident non-linearity: most of the increase in work participation occurs in moving from the marginal to the small class. After that, there is a small decrease, leaving work participation rates in the large landowning class similar to those in the marginal landowning class. For *boys,* this is mirrored in school attendance. In the case of *girls,* while their farm labour participation responds to land size in a similar fashion to boys, their wage labour participation drops with land size. As a result, the total work rates and also the school attendance rates of girls increase monotonically with land size. This is consistent with the finding that income effects for girls are typically larger than for boys[16]. In Ghana, the probability of farm work and all-work increases steadily with land size for boys and girls. School participation increases from marginal to small but then, surprisingly, decreases from small to large farms. The fact that school participation does not mirror work participation in Ghana as well as it does in Pakistan is consistent with the fact that it is easier to combine work and school in Ghana.

Often farming households operate land without owning it. In Pakistan, this is done either by leasing it in or by sharecropping. In Ghana, additional possibilities are use of "free farms" or village farms. Table 3b describes work and school participation of children by **land used** (operated) rather than land owned. It is convenient to think of land used as reflecting opportunities in the way that land owned does, but without the corresponding wealth (and inheritance) effect. In line with this, the paradoxical patterns are rather stronger here than in Table 3a. The farm employment rates of Pakistani girls are now higher on large farms than on small. For all-work, girls' employment displays an inverted U-shaped relation with land size, similar to that observed for boys. This is mirrored in school attendance. Remarkably, the school attendance rates of girls and boys

---

[16] Isolating wage work in rural Pakistan, Bhalotra (2000a) shows that the income effect on the labour supply of girls is twice that on the labour supply of boys. This is also the finding in some other studies. Behrman and Knowles (1999) survey income elasticities of school enrollment in developing countries and, here again, we see a larger elasticity for girls than for boys. Thus, for example, if there is an income shock, daughters are likely to be withdrawn from school before sons are.

Table 3b
Participation Rates by Land Operated

Land Group	%H	School		Farm work		All work	
		Boys	Girls	Boys	Girls	Boys	Girls
PAKISTAN							
Use Land=1	43	72.0	25.2	32.9	39.1	35.0	46.5
Use Land=0	57	73.5	35.7			20.7	28.0
Marginal	9	74.5	28.3	24.5	39.0	28.6	51.0
Small	20	71.0	21.9	34.8	35.7	36.3	42.9
Large	15	72.0	27.6	34.4	43.1	36.2	48.7
GHANA							
Use Land=1	90	77.8	71.1	52.4	47.5	55.1	50.7
Use Land=0	10	89.2	76.3			9.6	15.8
Marginal	27	84.3	79.1	44.8	42.7	48.8	46.7
Small	40	77.0	71.0	54.2	48.3	57.0	51.4
Large	23	72.7	62.8	57.4	51.4	58.6	53.2

Notes: Land *operated* includes land *owned* and land *used* under rental or sharecropping arrangements or else as free or village land. The cells for farm work are blank for households that do not operate land since farm work refers to farm work on the household-run farm. See Notes to Table 3a.

in large-farm households are lower than in marginal-farm households. For Ghana, employment rates behave similarly to the case of land owned. However, school attendance now decreases steadily in size of land operated.

Overall, there is considerable support for the notion that landholdings, whether owned or just operated, increase the probability that children work and decrease the probability that they attend school. This "wealth paradox" seems more evident for girls than for boys. These data are truly remarkable, given that we tend to associate poverty in rural economies with low levels of land ownership and to associate child labour with poverty. Since child labour on the household-run farm is easily the most common form of child labour, these data deserve investigation.

5. An Empirical Model and Estimation Issues

This section discusses the translation of the theoretical model in to a model estimable on the data we have. As indicated in Section 1, the available data do not permit

separate identification of the different substitution effects but they do allow us to separate these from the wealth effect of land. Since not all children have the option to work on the family farm, we use the *sub-sample* of households that own or operate land. The *deendent variable* in the hours of child work on the family farm. In rural Pakistan, 33% of households own land and 46% operate land. Ownership, at 44%, is not dissimilar in rural Ghana but there are more ways of sharing land and 90% of households operate some land (see column 2, Tables 3a, 3b). Since many children do not participate in farm work, we use the tobit estimator. All reported standard errors are robust (e.g. White, 1980), and adjusted to permit observations within clusters (primary sampling units) to be correlated (e.g. Deaton, 1997).

5.1. Variables

The measure of *land size* is acres of farm land owned or operated by the household[17]. In a departure from existing studies of child labour, we also include indicators for the *mode of operation of land* (*sharecropping*, *rent* in both countries and, additionally, whether *free* or *village land* in Ghana)[18]. For Ghana, we have a further variable which records the *number of plots of land*. This is less relevant in Pakistan where family land holdings tend to be consolidated and jointly operated, in contrast to regions of sub-Saharan Africa where men and women often have their own plots. Unfortunately, our data for Ghana do not permit us to assign the plots to individual members of the household. Household income is proxied by *food expenditure per capita*[19], which includes the imputed value of home-produced consumption. This is expected to be smoother than actual income (see Altonji, 1983). Even though rural economies are characterised by imperfect capital markets, there is some evidence that poor households achieve a degree of consumption smoothing (see Townsend (1994) for example).

As a measure of household insecurity, we include an indicator for whether the household has a *female head*. The equations include a quadratic in *child age*. Since the

---

[17] We investigated using land owned instead and the results are qualitatively similar. The marginal product or "wage" effect of land-size is likely to be similar for land owned and land operated. However, the wealth, collateral and inheritance-related effects will tend to be stronger in the case of land owned.

[18] One rationalisation of the benefits to the landlord from pursuing sharecropping instead of renting the land out or hiring wage labour in, is that it improves the landlord's access to labour by making available the labour of the tenant's family in addition to the labour of the tenant (see Basu, 1997, for example).

[19] There is no need to assume a equivalence scale because size and detailed household composition variables are included in the equations. Food expenditure is preferred to total expenditure because the latter will include expenditures on durables which are not as smooth.

incentive to put a child to work on the farm depends upon the size of the farm relative to the size of the available pool of family labour, we include household size and composition as regressors. Given farm size, we expect household size to have a negative impact on child work.

Parents' wages are proxied by *mothers' and fathers' age and educational level.* To the extent that womens' education reflects their bargaining power (by virtue of being an asset that they can take away with them if they leave the household), inclusion of mothers' education as distinct from fathers' education goes some way towards relaxing the unitary modelling assumption implicit in (1). These variables may also have direct effects if children with better educated parents derive more from their education, or are likely to be better informed in job-search (this will affect the dynamic returns to education versus work). We further relax the simplicity of the theoretical structure by allowing parents to have preferences over children that depend upon *birth order* (evidence of such effects is, for example, in Das Gupta (1987) and Butcher and Case (1994)) and on the *relation of the child to the household head.* Alternative relations include niece, nephew, grandchild, sibling, and it is not unusual in Ghana to find foster children in the household (see Ainsworth, 1996).

Province dummies are included to capture variation in productivity or labour demand. Rather than measure expenditure on schooling, we use dummy variables for whether a *primary, middle and secondary school* are present in the community where the child lives. Access may further be influenced by whether there is *public transport* in the community. We include religion and ethnicity variables in order to capture *attitudinal/cultural differences* in the valuation of school and work. This is expected to be especially relevant when looking at girls, towards whom attitudes tend to incorporate greater heterogeneity. Some other community-level characteristics are included so as to control for work opportunities as well as norms at a finer level of disaggregation than the province.

Means for the sub-samples of working and non-working children are in Appendix Tables 1 and 2. The variables used differ between the countries to some extent because of differences in the questionnaires. A comparison of means across these sub-samples, and a comparison of means across the two countries can be found in Bhalotra and Heady (2001).

5.2. Potential Endogeneity of Consumption and Land Operated

Since child labour contributes to household income, food consumption (which proxies permanent income) is potentially endogenous. As children working on the family farm are not paid a wage, their contribution cannot be deducted from total income. Even if we could observe child income, the endogeneity problem would not be resolved by subtracting it from the total since the labour supply of different household members is likely to be jointly determined[20]. We therefore instrument household consumption using the cluster (or community) level going wage rate for men in agricultural work, as well as indicators of the level of infrastructural development of the community (e.g. is there a railway line, is there a market, is there electricity, is there piped water, etc.). It may also be argued that the size of land operated is endogenous: families with large numbers of children may lease in more land in order to be able to employ them productively. We therefore instrument total land-holdings with size of land owned, an index of inequality in the distribution of land within the community, and with the same set of infrastructure indicators. Land owned and land inequality may be expected to be good predictors of land leased in or out and therefore of total landholdings. It is reasonable to assume that land owned is exogenous on the grounds that buying and selling of land is limited by a very weak land market (e.g., Swain (2001), Rosenzweig and Wolpin (1985)). We use the generalised residuals procedure which Smith and Blundell (1986) show gives consistent estimates when the dependent variable is censored. Suppressing individual subscripts, let the main equation, for hours of work (H), be written as:

$$H^* = X\beta + Y\gamma + e \qquad (19)$$

where hours (H) is a censored endogenous variable, X is a vector of exogenous variables and Y is the endogenous variable. The auxiliary equation describing Y in terms of exogenous variables Z (Z includes X) is:

$$Y = Z\pi + u \qquad (20)$$

The error terms e and u are assumed to be jointly normally distributed. Let $e = u\alpha + \varepsilon$. Substituting for e in (19) gives the conditional model,

$$H^* = X\beta + Y\gamma + u\alpha + \varepsilon \qquad (21)$$

---

[20] Bhalotra (2000b) rejects the exogeneity of both mother's and father's labour supply in an equation for child labour supply.

where u is an estimate obtained by OLS estimation of (20), and (21) can be estimated by the standard tobit procedure. A test of $\alpha=0$ is a test of the null hypothesis that Y is exogenous.

6. Determinants of Child Work

We first present estimates of a **parsimonious model** corresponding to equation (13), in which the only variable in the vector Z is household size (Table 4). Estimates of

Table 4: Child Work on the Household Farm: Parsimonious Model Marginal Effects

	Pakistan boys	Pakistan girls	Ghana boys	Ghana girls
Participation Probabilities				
Log p.c. food expend (0.1)	-0.026***	-0.010	0.012***	0.0095**
Acres (1 acre) x 10^2	0.026	0.15**	0.41***	0.60***
Acres^2 (1 acre) x 10^4			-0.31*	-0.30
Household size (1 person)	-0.021***	-0.013***	0.0098***	-0.0069
Residual (lpcfdexp)	0.022***	0.017**	-0.006	-0.000053
Hours Conditional on Work				
Log p.c. food expend (0.1)	-0.68***	-0.18	0.22***	0.16**
Acres (1 acre) x 10^2	0.68	2.70**	7.40***	10.20***
Acres^2 (1 acre) x 10^4			-5.50*	-5.10
Household size (1 person)	-0.54***	-0.25***	0.18***	-0.12
Residual (lpcfdexp)	0.59***	0.030**	-0.11	-0.0009
N	513	473	1272	1127
Log likelihood	-969.82	-901.27	-2895.3	-2278.3

Notes: Figures are marginal effects at sample means for the change indicated in parentheses in column 1. Based on tobit estimates with *Dependent variable*: hours worked by children on the household farm. Sample: Rural households that operate some land. ***, ** and * denote significance at the 5%, 10% and 12% levels respectively. The regressions included region, religion and ethnicity dummies. Since some regions for Ghana coincided with ethnic groups, they had to be dropped. Variables that were insignificant in all four samples are not shown.

marginal effects for a model with a larger set of **control variables** are presented in Tables 5 and 6 for the probability of working and for the hours of work conditional on working respectively. The standard marginal effects are multiplied by 0.1 for per capita food expenditure (Y) because this is in logarithms and for household composition variables

because these are proportions and, as a result, the effects of a 10% change in these variable can be directly read off the Table.

For landholdings, the Smith-Blundell test did not reject exogeneity and there was no significant difference in the IV and OLS estimates. On the other hand, exogeneity was rejected for food consumption in each of the samples other than that of boys in Ghana. The first stage regression explains 31% of the variation in consumption in Pakistan and 29% in Ghana, and the instruments are jointly significant at 1% and 10% respectively. The results change significantly (and in the expected direction) if we do not instrument, underlining the importance of using IV methods in studying the impact of household income on child work. Since most papers investigating child labour do not instrument household income (see Section 2.3), their estimates will tend to carry upward biases. The rest of this section presents the results, first for Ghana, and then for Pakistan, where contrasts with Ghana are highlighted. Further analysis and a summary are presented in the concluding section.

6.1. Results for Ghana

Consider the parsimonious model in Table 4. Farm size has a highly significant positive effect for both boys and girls, the effect for girls being 50% larger than that for boys. Household per capita consumption has an unexpectedly positive effect on child work, even after correcting for its endogeneity. Boys from larger households work significantly more while girls' farm labour is independent of household size.

Adding a range of control variables (Tables 5-6) makes a dramatic difference to these results. The effects of farm size, consumption and household size all become insignificant for boys. For girls, a significant positive effect of farm size persists, while consumption and household size both become negative and significant. For girls, therefore, each of the three main variables takes the sign predicted by theory once appropriate conditioning variables are included. The absence of a negative income effect on the work of boys in Ghana may be related to the fact that 75% of these boys combine work and school (see Table 1 and equation (10)).

Table 5: Child Participation on the Household Farm: Marginal Effects

	Pakistan boys	Pakistan girls	Ghana boys	Ghana girls
Child characteristics				
Age (1 year)	0.081***	0.033***	0.15***	0.15***
Age-squared (1 year)			-0.0041	-0.0047*
Child of head (0/1)	0.12*	0.15**	-0.066**	-0.006
Household resources				
Ln p.c. food expend (0.1)	-0.051***	-0.017	0.0048	-0.021***
Acres (1 acre) x 10^2	0.069	0.20*	-0.071	0.36***
Acres^2 (1 acre) x 10^4			-0.00015	-0.014**
Farm organisation				
Number of farms (by 1)			0.046***	0.048***
Rent? (0/1)	-0.031	0.12**	0.14***	0.14***
Sharecrop? (0/1)	0.11***	0.06	-0.040	0.011
Free farm (0/1)			0.14***	0.16***
Village farm (0/1)			0.031	0.20***
Household structure				
Household size (1 person)	-0.024***	-0.011	-0.0055	-0.020***
Female head? (0/1)	0.39***	0.22**	0.036	0.080*
Males<5(7) yrs (0.1)	-0.079***	-0.031	-0.0041	-0.038***
Males 5-9 yrs (0.1)	-0.059*	-0.090***		
Males 15-19 yrs(0.1)	-0.049	-0.051	-0.0065	-0.016
Males 20-59 yrs(0.1)	0.0043	-0.077**	-0.0057	0.024
Males >60 years (0.1)	-0.014	0.062	0.026	0.030
Females<5(7) yrs (0.1)	-0.037	0.011	0.022	-0.029**
Females 5-9 yrs (0.1)	0.015	-0.014		
Females 15-19 yrs(0.1)	-0.13***	-0.054	-0.013	-0.0084
Females 20-59 yrs(0.1)	0.019	0.003	0.00014	0.0006
Females >60 years (0.1)	-0.079	-0.25***	0.0086	0.17
Parents' education				
Mother mid/sec (0/1)	-1.55***	-2.17***	-0.093***	-0.028
Father secondary (0/1)	0.12	-0.52***	-0.039	0.029
Community variables				
Primary school girls (0/1)	0.11	-0.17	-0.043	-0.064
Primary school, boys(0/1)	0.040	0.39***		
Middle school(0/1)			-0.093***	-0.067*
Secondary school (0/1)			-0.099**	-0.128***
Public transport(0/1)	-0.048	-0.095**	-0.030	-0.12***
Residual (lpcfdexp)	0.041***	0.028*	0.0017	0.034***
N (#censored obs)	471 (323)	436 (284)	1263 (720)	1122 (702)
Log likelihood	-847.78	-776.32	-2694.92	-2129.33

Notes: See Table 4. These regressions included region, religion and ethnicity dummies. Since some regions for Ghana coincided with ethnic groups, they had to be dropped.

Table 6: Hours of Child Farm Work Conditional on Participation: Marginal Effects

	Pakistan Boys	Pakistan Girls	Ghana Boys	Ghana Girls
Child characteristics				
Age (1 year)	1.86***	0.46***	2.33***	2.25***
Age-squared (1 year)			-0.063	-0.069*
Child of head (0/1)	2.70*	2.09**	-1.02**	-0.083
Household resources				
Ln p.c. food expend (0.1)	-1.16***	-0.24	0.073	-0.31**
Acres (1 acre) x 10^2	1.60	2.90*	1.10	5.40***
Acres^2 (1 acre) x 10^4			-0.0024	-0.20**
Farm organisation				
Number of farms (by 1)			0.71***	0.70***
Rent (0/1)	-0.70	1.74**	2.09***	2.14***
Sharecrop (0/1)	2.62***	0.78	-0.62	0.15
Free farm (0/1)			2.22***	2.32***
Village farm(0/1)			0.47	2.96***
Household structure				
Household size (by 1)	-0.54***	-0.16	-0.085	-0.30***
Female head? (0/1)	9.02***	3.06**	0.55	1.18*
Males <5(7) years (0.1)	-1.8***	-0.44	0.063	-0.56***
Males 5-9 years(0.1)	-1.35*	-1.27***		
Males 15-19 years(0.1)	-1.11	-0.71	-0.10	-0.24
Males 20-59 years(0.1)	-0.098	-1.09**	0.088	0.36
Males >60 years (0.1)	-0.32	0.88	0.39	0.44
Females<5(7) yrs (0.1)	-0.86	0.16	0.34	-0.43**
Females 5-9 yrs (0.1)	0.35	-0.20		
Females 15-19 yrs(0.1)	-2.86***	-0.76	-0.20	-0.12
Females 20-59 yrs(0.1)	0.43	0.045	0.0021	0.0096
Females over 60 yrs(0.1)	-1.81	-3.53***	0.13	0.25
Parents' education(0/1)				
Mother mid/sec (0/1)	-35.45***	-30.58***	-1.43***	-0.41
Father secondary (0/1)	2.75	-7.26***	-0.6	0.43
Community variables				
Primary school girls (0/1)	2.43	-2.41	-0.67	-0.94
Primary school, boys(0/1)	0.90	5.43***		
Middle school(0/1)			-1.43***	-0.98*
Secondary school (0/1)			-1.53**	-1.88***
Public transport(0/1)	-1.11	-1.34**	-0.46	-1.72***
Residual (lpcfdexp)	0.95***	0.40*	0.027	0.49***
N (#censored obs)	471(323)	436(284)	1263(720)	1122(702)
Log likelihood	-847.78	-776.32	-2694.92	-2129.33

Notes: See Notes to Table 4.

The rest of this section summarises the effects of the additional variables in Tables 5 and 6. Child characteristics have broadly similar effects for boys and girls. Child work increases with *age* at a decreasing rate. A complete set of *birth-order* dummies was included but their coefficients were poorly determined. They were therefore replaced by a single indicator variable for whether the child in question was the oldest child in the household. This too was insignificant for both genders and since it is closely related to age, it was dropped. The dummy indicating whether the child was the *child of the household head* (as opposed to nephew, sibling, foster child, etc) is negative for both genders and significant for boys. So there is some favour for sons.

Households in Ghana often own several plots of land, with ownership often divided between men and women in a household (e.g. Udry, 1996). We find a strong positive effect of the *number of farms* operated on hours of work, of similar magnitude for boys and girls. Since this result obtains when controlling for acres of land operated by the household, it suggests not a size effect but an effect associated with the subdivision of land. This merits further micro-level research. The *mode of operation of land* (sharecrop, rent etc) also matters.

Girls, but not boys exhibit significantly more hours of farm work in *female-headed households.* Indeed, there are no effects of *household composition* on boys' work. A further significant effect, restricted to girls, is that they work less in households with male or female children under 7 years of age, that is, younger than themselves. The only significant effect of the parent education variables is that the sons of *mothers with secondary-level education* work less. Since this is at given levels of household living standards, it would appear to reflect preferences rather than resources.

Dummies for *the presence of primary, middle and secondary schools* in the cluster take the expected negative signs and the latter two are significant for both genders[21]. *Public transport* in the village has a negative effect that is restricted to girls. This is consistent with the hypothesis that distance to school may deter the attendance of girls more than it does that of boys. The *region dummies* are jointly very significant and have larger effects for girls (χ^2_6=58 for boys and χ^2_6=48 for girls, p>χ^2=0 for both). *Religion* has no systematic effect on boys' work (χ^2_2=2, p>χ^2=0.37) but Christian girls work

[21] The significance of cluster-specific (or community) variables in determining child work in Ghana is substantially altered once standard errors are robust and cluster-adjusted. All equations report the correct (adjusted) standard errors.

significantly fewer hours on average than Animist girls who work less than Muslim girls (χ^2_2=5.3, p>χ^2=0.07). The dummies for ethnicity are insignificant for girls (χ^2_5=3.2, p>χ^2=0.67). Boys of Ewe *ethnicity* are significantly less likely to work (χ^2_5=11.9, p>χ^2=0.04).

6.2. Results for Pakistan

The parsimonious equations in Table 3 show a positive effect of farm size on girls' work but the positive coefficient estimated for boys is insignificant. Household consumption has the expected negative effect on child work but this is only significant for boys[22]. For both boys and girls, hours of work fall significantly with household size.

When additional regressors are included (Tables 5-6), all of these effects persist except for the effect of household size on girls' work, which becomes insignificant. Across both genders, the significant coefficients take signs consistent with our theoretical framework. The rest of this section considers the effects of the additional variables.

Child *age* has a positive effect on hours worked, which is much larger for boys than for girls. There are no *birth order* effects. In contrast to Ghana, *children of the household head* in Pakistan are more likely than other children in the household to be at work on the farm. As in Ghana, the *mode of operation* of land impacts on child labour for a given size of farm.

The children of *female-headed households* in Pakistan work significantly more and the effect is bigger for boys than for girls. In Ghana this effect was restricted to girls. These results suggest that there are aspects of ill-being or insecurity in female headed households that household consumption and farm size do not pick up. Controlling for household size, there are some fairly complex effects of the *age-gender composition of the household* on child work in Pakistan, in contrast with Ghana where these effects were limited. Both boys and girls in Pakistan work less if they have young siblings. We found a similar effect for Ghanaian girls. This contradicts evidence from other regions which finds that children - and especially girls - with more siblings work longer hours on average (see Lloyd (1993) and Jomo (1992)). In addition, girls in Pakistan work significantly less in households with a relatively high fraction of adult men and elderly women. The fraction of adult men may indicate the degree of insurance achievable

[22] The absence of an income effect on girls' work is somewhat surprising. It may be related to the fact that boys work considerably longer hours than girls on average (Table 2).

through increased labour market activity in response to a shock (see Kochar, 1995, for example). The greater this insurance, the smaller the dependence on child labour for insurance. Boys work less in households with a high fraction of 15-19 year-old girls. There is a significant negative effect of *fathers' secondary education* that is restricted to girls. *Mothers' education* to the level of middle or secondary school has a huge negative effect on child work for both genders, in contrast to Ghana where mothers education reduces the work of boys but not girls.

The presence in the cluster of a *primary school* for girls reduces the farm labour of girls and, possibly because of sibling competition for resources, the presence of a primary school for boys increases girls' farm labour. These school-access variables have no effect on boys' work. The presence of a bus route (public transport) has a negative effect on girls' work, just as in Ghana. *Province dummies* (χ^2_3=11.7, p>χ^2=0.0) and *religion* dummies (χ^2_2=17.9, p>χ^2=0.0) are jointly significant for girls though not for boys (χ^2_3=4.5 χ^2_2=2.9, respectively). Amongst girls, Christians work significantly less than Muslims who work significantly less than other Non-Muslims. The tendency for Christian girls to work relatively less was also seen for Ghana. Christians constitute 1.5% of the population and other non-Muslims (mostly Hindus) account for another 3.6%; the vast majority are Muslim.

6.3. Summary of Results

Controlling for household consumption, household size and ownership/tenancy arrangements, we identify a positive effect of farm size on girls' work in both countries, and no significant association for boys. This suggests that the substitution effect is larger for girls than for boys, which is consistent with the finding in a range of developed country data sets that female labour supply is more elastic than male labour supply. It also coincides with the finding that the substitution effect is larger for girls than for boys in the supply of *wage* labour in Pakistan (see Bhalotra, 2000a). With reference to our discussion of different substitution effects in Section 3, it would seem most likely that the positive coefficient on farm size obtained for girls reflects a current-period marginal productivity effect, its absence for boys indicating higher returns to school attendance (the alternative use of child time). Although boys are more likely than girls to inherit land, they also seem, in these countries, to get higher monetary rewards from their education than girls. So it seems that the rewards from education outweigh the rewards from work experience

for boys. Moreover, since boys rather than girls traditionally look after their parents in their old age (except, possibly, amongst the *Akan* in Ghana) this may motivate parents to invest more in ensuring that they grow up to be rich!

A negative relation of child work and household food consumption per capita (our proxy for income) is identified for boys in Pakistan and girls in Ghana, the marginal effect being much larger in the former case[23]. In Pakistan, an increase in consumption of 10% is estimated to reduce the probability of boys' work by 5 percentage points (so that, at the mean, the observed participation rate of 32% would fall to 26%) and, conditional on working, the same change in expenditure is expected to reduce hours of work by 1.16 per week. The corresponding effects for girls in Ghana are 2 percentage points and 0.31 hours per week. For comparison with existing empirical work on child labour, it is worth emphasising that we would find weaker income effects if we did not account for simultaneity bias. Section 2 listed reasons why the existing literature may not have identified a positive relation of household poverty and child work, and the potential misspecifications noted there were avoided in this paper. We nevertheless find no income effect for the other two of the four groups of children in our sample.

We detect significant effects of land tenure type (mode of operation) on child labour at given acreage. No other study of child labour appears to have considered this factor. We find that children from larger households are *not* more likely to work or to work harder. Female headship significantly increases child labour in every case except for that of boys in Ghana. The size of this effect is much larger in Pakistan than in Ghana, where the proportion of female-headed households is enormously larger (30% as compared with less than 3%). There are some interesting and large effects of the age-gender composition of the household in Pakistan, though the corresponding effects in Ghana are weak. Father's secondary education significantly reduces girls' work in Pakistan but has no effect on the labour of the other three groups. Mother's secondary education tends to reduce child hours of work in both countries. In Ghana this effect is restricted to boys but in Pakistan it is significant for boys and girls, and of similar magnitude. These findings reinforce a growing literature on the importance of female education in achieving positive outcomes for children across a range of countries. The

[23] The negative income effect for girls in Ghana did not appear in the parsimonious model in Table 3, showing that its identification relies upon introducing the set of controls.

magnitude of the effects we find is so large that policy aimed at eliminating child work is best targeted here.

7. Conclusions

Comparative work is useful in investigating whether there are behavioural patterns relating to child work. While South Asia has the largest number of working children, Sub-Saharan Africa has the highest incidence of child labour. Even though it claims the majority of child workers, the agricultural work of children is severely understudied as compared with the more visible forms of work in Latin America and Asia, which involve children in labour-intensive manufacturing. The results of the paper are interesting not only with regard to similarities and differences between Pakistan and Ghana but also with regard to gender differences. The estimates obtained in this paper permit consideration of the effects on child labour of, for example, land redistribution, income transfers and fertility change.

The results are summarised in Section 6.3. The wealth paradox observed in the original data for both Ghana and Pakistan persists in the case of girls but vanishes in the case of boys, once we condition on income and other covariates. The results are consistent with our hypothesis that imperfect rural labour markets can explain the puzzling fact that children of land-poor households are often more likely to be in school than the children of land-rich households. Since it is unlikely that girls are more productive in farm labour than boys and inheritance effects are likely to be stronger in the case of boys, the difference in the results by gender suggests that the (discounted) returns to school for boys are perceived to be larger than for girls.

What are the implications of this paper for public policy? The paper underlines the observation that the majority of children in developing countries work as family-farm labour. As a result, policies that have been recently discussed in the context of child labour- minimum wage legislation or trade sanctions- have limited direct relevance to the problem. If our inference is correct, then policy could work towards redressing the gender imbalance in returns to education, for example, by targeting girls in educational programmes. We stress that labour market failure plays an important role in creating what we call the wealth paradox. To the extent that problems such as moral hazard are easier to manage in competitive labour markets (e.g. because the threat of firing is more credible), interventions that encourage development of the wage labour market will help, for

example, improvements in the roads and telecommunications infrastructure. Oddly enough, the development of land markets is likely to be closely linked to the development of a good school infrastructure: People would be more willing to buy and sell physical capital like land if they had human capital that they could trade in a dynamic labour market. Overall, although child labour may be a parental choice and it may be the best choice given the constraints people face, its prevalence is a symptom of market and institutional failures. Identifying these is a first step in formulating appropriate policy action.

References

Ainsworth, Martha, 1996, Economic aspects of child fostering in Cote d'Ivoire, *Research in Population Economics*, Volume 8, 25-62.

Altonji, J.G., 1983, Intertemporal substitution in labour supply: Evidence from micro-data, *Journal of Political Economy*.

Basu, Kaushik and Van, P.(1998), The Economics of Child Labor, *American Economic Review*, June.

Basu, Kaushik, 1997, *Analytical Development Economics:The Less Developed Economy Revisited*, MIT Press.

Behrman, Jere and James Knowles, 1999, Household income and child schooling in Vietnam, *The World Bank Economic Review*, Vol. 13(2), May.

Benjamin, Dwayne, 1992, Household composition, labour markets and labour demand: Testing for separation in agricultural household models, *Econometrica*, 60(2): 287-322.

Bekombo, M. (1981), The child in Africa: socialization, education and work, Chapter 4 in G. Rodgers and G. Standing (eds.), *Child Work, Poverty and Underdevelopment*, Geneva: ILO.

Bhalotra, Sonia, 1999, How to free child labour from the poverty trap, *The Guardian Newspaper*, Monday 12 April 1999, Opinion Piece, Debate section of Economics Page.

Bhalotra, Sonia, 2000a, Is child work necessary?, DP No.26, Development and Distribution Series, STICERD, London School of Economics, August.

Bhalotra, Sonia, 2000b, Investigating separability of parent and child labour, Mimeograph, University of Cambridge.

Bhalotra, Sonia and Chris Heady, 1998, Working for the family: An investigation of child farm labour in rural Ghana and Pakistan, Mimeograph, University of Bristol.

Bhalotra, Sonia and Chris Heady, 2001, Child activities in South Asia and Sub-Saharan Africa: A comparative analysis, in: P. Lawrence and C. Thirtle, eds., *Africa and Asia in Comparative Development*, (London: Macmillan), forthcoming.

Blunch, N-H and Dorte Verner, 2000, The child labour-poverty link revisited: The case of Ghana, Mimeograph, The World Bank.

Butcher, Kristin and Anne Case, 1994, The effect of sibling sex composition on women's education and earnings, *Quarterly Journal of Economics*, 109(3), pp. 531-563.

Canagarajah, Sudarshan and Coulombe, Harry 1998, Child labor and schooling in Ghana, Mimeograph, World Bank.

Cigno, Alessandro, Furio Rosati and Zafiris Tzannatos, 1999, Child labor, nutrition and education in rural India: An economic analysis of parental choice and policy options, Paper presented at the World Bank Conference on Child Labour, Washington DC, April 11-13, 2000.

Cockburn, John, 2000, Child labour in Ethiopia: Opportunities or income constraints?, Paper presented at a Conference on Opportunities in Africa: Microeconomic Evidence from Households and Firms, Oxford, April.

Das Gupta, Monica, 1987, Selective discrimination against female children in rural Punjab, India, *Population and Development Review*, 13(1), 77-100.

Deaton, Angus, 1997, *The Analysis of Household Surveys: The Microeconometrics of Household Surveys*, The World Bank.

Deolalikar and Vijverberg, 1987, A test of heterogeneity of family and hired labour in Asian agriculture, *Oxford Bulletin of Economics and Statistics*, 49, 291-303

Eswaran, Mukesh, 1996, Fertility, literacy and the institution of child labor, Mimeograph, University of British Columbia, Vancouver.

Foster, Andrew and Mark Rosenzweig, 1994, A Test for Moral Hazard in the Labor Market: Contractual Arrangements, Effort, and Health, *The Review of Economics and Statistics*, Vol. 76, No. 2., pp. 213-227.

Galasso, Emanuela, 1999, Intrahousehold allocation and child labor in Indonesia, Department of Economics, Boston College, Mimeograph.

Glewwe, Paul, 1996, The relevance of standard estimates of rates of return to schooling for education policy: A critical assessment, *Journal of Development Economics*, Vol.51, pp.267-290

Grootaert, Christian, 1998, Child labour in Cote d'Ivoire: Incidence and determinants, Discussion Paper, Social Development Department, The World Bank, Washington D.C.

Grootaert, Christiaan and Harry Anthony Patrinos (1998), *The Policy Analysis of Child Labor: A Comparative Study*, The World Bank.

Heady, Chris, 1999, The effects of child work on educational achievment, Discussion Paper, UNICEF International Child Development Centre, Florence.

International Labor Organisation, 1996, *Child Labour Today: Facts and Figures*, Geneva: ILO.

Jacoby, Hanan G., 1993, Shadow wages and peasant family labour supply: an econometric application to the Peruvian Sierra, *The Review of Economic Studies*, Vol. 60, No. 4., pp. 903-921.

Jensen, Peter and Helena Skyt Nielsen (1997), Child labour or school attendance? Evidence from Zambia, *Journal of Population Economics*, 10, pp. 407-424.

Jomo, K.S. (ed.), 1992, *Child labor in Malaysia*, Kuala Lumpur: Varlin Press.

Kanbargi, R. and P.M. Kulkarni, 1995, The demand for child labour and child schooling in rural Karanataka, India, Mimeograph, Institute of Social and Economic Change, Bangalore, India.

Kassouf, A.L., 1998, Child labour in Brazil, Mimeograph, London School of Economics & University of Sao Paulo.

Kochar, Anjini, 1995, Explaining household vulnerability to idiosyncratic income shocks, *American Economic Review*, Vol. 85(2), Papers and Proceedings, May.

Lahiri, Sajal and Saqib Jafarey (1999), Will trade sanctions reduce child labour?: The role of credit markets, Mimeograph, Department of Economics, University of Essex.

Ranjan, Priya (1999), An economic analysis of child labor, *Economics Letters*, 64, 99-105.

Lloyd, C.B., 1993, Fertility, family size and structure- consequences for families and children, Proceedings of a Population Council seminar, New York, 9-10 June, 1992, New York: The Population Council.

McElroy, M., 1990, Nash-bargained household decisions- Reply, *International Economic Review*, 31(1):237-242.

Patrinos, Harry and George Psacharapoulos, 1997, "Family size, schooling and child labor in Peru - An empirical analysis", *Journal of Population Economics*, Vol. 10, 387-405.

Psacharapoulos, George, 1997, "Child labor versus educational attainment: Some evidence from Latin America", *Journal of Population Economics*, Vol. 10 (4), 1-10.

Ravallion, Martin and Quentin Wodon, 2000, Does child labour displace schooling? Evidence on behavioural responses to an enrolment subsidy, *The Economic Journal*, vol. 110, pp.c158-c175.

Ray, Ranjan, 2000, Analysis of child labour in Peru and Pakistan: A comparative study, *Journal of Population Economics*, Vol. 13(1), 3-19.

Rosenzweig, Mark, 1980, Neoclassical theory and the optimizing peasant: An econometric analysis of market family labor supply in a developing country, *Quarterly Journal of Economics*, February, 31-55.

Rosenzweig, Mark, 1995, Why are there returns to schooling, *American Economic Review*, Vol. 85(2), May, 153-158.

Rosenzweig, Mark and Kenneth Wolpin, 1985, Specific experience, household structure, and intergenerational transfers: farm family land and labor arrangements in developing countries, *Quarterly Journal of Economics*, Vol. 100, Supplement, pp. 961-987.

Smith, Richard J. and Richard Blundell, 1986, An exogeneity test for the simultaneous equation tobit model, *Econometrica*, 54, 679-85.

Strauss, John, 1986, in Singh, I., L. Squire and J. Strauss, eds. (1986). *Agricultural Household Models: Extensions, Application and Policy*. Baltimore (Md.), Johns Hopkins University Press.

Swain, Ranjula Bali (2001), *Demand, Segmentation and Rationing in the Rural Credit Markets of Puri*, PhD Dissertation, Economic Studies 54, Department of Economics, Uppsala University, Sweden.

Townsend, Robert, 1994, Risk and insurance in village India, *Econometrica,* May, 62, 539-92.

Udry, Christopher, Gender, agricultural production and the theory of the household, *Journal of Political Economy*, 104, October: 1010-1046.

U.S. Department of Labour, 2000, By the sweat and toil of children (vol.VI): An economic consideration of child labor, Washington DC: U.S. Department of Labour, Bureau of International Labor Affairs.

Weir, Sharada and John Knight, 2000, Adoption and diffusion of agricultural innovations in Ethiopia: the role of Education, WP 2000.5, Centre for the Study of African Economies, University of Oxford.

White, H., 1980, A heteroskedasticity-consistent covariance matrix estimator and a direct test for heteroskedasticity, *Econometrica* 48: 817-30.

Appendix Table 1
Variable Means for Workers and Non-Workers by Gender
RURAL GHANA

	Boys in Ghana		Girls in Ghana	
	Workers	**Non-workers**	**Workers**	**Non-workers**
#Observations	687	884	523	884
Dependent variable				
hours worked on farm	15.5	0	15.5	0
Child characteristics				
age	10.9	9.8	10.9	9.7
first child	0.61	0.47	0.64	0.48
child of head of hh	0.77	0.84	0.72	0.81
Household resources				
ln pc food expenditure	-0.33	-0.40	-0.27	-0.39
acres of land	9.34	8.23	9.77	7.57
Size of farm				
number of farms	2.0	1.94	2.1	1.92
rent land?	0.086	0.055	0.071	0.083
sharecrop land?	0.070	0.067	0.067	0.066
freely available land?	0.23	0.15	0.21	0.15
village-owned land?	0.23	0.26	0.24	0.28
Household structure				
household size	7.3	7.2	6.9	7.3
female head?	0.27	0.20	0.34	0.22
males under 7 years	0.10	0.11	0.091	0.11
males 7-14 years	0.28	0.28	0.10	0.095
males 15-19 years	0.059	0.049	0.059	0.049
males 20-59 years	0.10	0.11	0.11	0.11
males over 60 years	0.033	0.032	0.032	0.028
females under 7 yrs	0.098	0.097	0.097	0.103
females 7-14 years	0.085	0.088	0.27	0.26
females 15-19 years	0.041	0.034	0.037	0.039
females 20-59 years	0.16	0.18	0.18	0.18
females over 60 years	0.033	0.020	0.037	0.019

Appendix Table 1: (cont'd)
Variable Means for Workers and Non-Workers by Gender
RURAL GHANA

	[illegible]	[illegible]	Girls in Ghana	
	[illegible]	[illegible]	Workers	Non-workers
Parents' education				
mother none	0.68	0.66	0.66	0.69
mother primary	0.15	0.11	0.13	0.14
mother secondary	0.17	0.23	0.21	0.17
father none	0.51	0.49	0.46	0.53
father primary	0.086	0.088	0.079	0.085
father secondary	0.40	0.42	0.46	0.38
Community variables				
local primary school	0.85	0.89	0.87	0.88
local middle school	0.61	0.64	0.70	0.63
local secondary school	0.14	0.11	0.11	0.10
local public transport	0.52	0.50	0.52	0.47
Regions				
Central Region	0.14	0.083	0.15	0.10
Eastern Region	0.028	0.25	0.027	0.21
West	0.096	0.11	0.12	0.11
Volta Region	0.14	0.088	0.14	0.081
Ashanti Region	0.24	0.078	0.26	0.078
Brong Ahafo Region	0.13	0.13	0.15	0.14
North	0.08	0.11	0.05	0.12
Upper West	0.04	0.04	0.03	0.05
Upper East	0.08	0.10	0.08	0.11
Ethnic groups				
Akan	0.57	0.48	0.61	0.46
Ewe	0.038	0.058	0.056	0.059
Ga-adangbe	0.038	0.11	0.024	0.089
Dagbani	0.054	0.041	0.028	0.049
Nzema	0.013	0.013	0.015	0.017
Other	0.29	0.30	0.26	0.32
Religion				
Christian	0.61	0.60	0.65	0.58
Animist/traditional	0.19	0.25	0.16	0.25
Muslim	0.20	0.15	0.19	0.17

Notes: See Notes to Table 4. Per capita expenditure for Ghana is expressed as a ratio to its mean, not so for Pakistan. This makes no effective difference to the tobit estimates since the variable is in logarithms and there is an equation constant.

Appendix Table 2
Variable Means for Workers and Non-Workers by Gender
RURAL PAKISTAN

	Boys in Pakistan		Girls in Pakistan	
	Workers	Non-workers	Workers	Non-workers
# Observations	191	427	200	365
Dependent variable				
hours worked on farm	25.6	0	14.9	0
Child characteristics				
age	12.2	11.6	12.0	11.8
first child	0.69	0.50	0.63	0.60
child of head of hh	0.85	0.78	0.87	0.79
Household resources				
ln pc food expenditure	5.28	5.36	5.36	5.34
acres of land	11.8	11.3	12.0	9.82
Size of farm				
rent land?	0.13	0.15	0.16	0.16
sharecrop land?	0.48	0.33	0.43	0.30
Household structure				
household size	9.6	11.2	9.8	10.9
female head?	0.03	0.01	0.045	0.014
males under 5 years	0.051	0.056	0.062	0.060
males 5-9 years	0.10	0.196	0.095	0.089
males 10-14 years	0.18	0.16	0.072	0.052
males 15-19 years	0.052	0.068	0.060	0.061
males 20-59 years	0.16	0.16	0.15	0.17
males over 60 years	0.027	0.028	0.033	0.026
females under 5 yrs	0.059	0.064	0.070	0.063
females 5-9 years	0.10	0.084	0.090	0.086
females 10-14 years	0.060	0.051	0.16	0.17
females 15-19 years	0.039	0.051	0.044	0.049
females 20-59 years	0.16	0.16	0.15	0.16
females over 60 years	0.014	0.021	0.0094	0.025

Appendix Table 2 (Cont'd)
Variable Means for Workers and Non-Workers by Gender
RURAL PAKISTAN

	Boys in Pakistan		Girls in Pakistan	
	Workers	Non-workers	Workers	Non-workers
Parents' education				
mother none	0.98	0.97	0.99	0.94
mother primary or less	0.023	0.021	0.011	0.046
mother mid/secondary	0.00	0.008	0.00	0.012
father none	0.66	0.63	0.71	0.61
father primary or less	0.22	0.21	0.20	0.19
father middle	0.067	0.064	0.066	0.082
father secondary	0.056	0.092	0.020	0.12
Community variables				
boy's primary school	0.88	0.91	0.93	0.90
boy's middle school	0.44	0.44	0.38	0.41
girl's primary school	0.85	0.86	0.87	0.82
girl's middle school	0.28	0.28	0.25	0.26
local public transport[1]	0.66	0.62	0.60	0.62
Regions				
Punjab	0.50	0.47	0.42	0.47
Baluchistan	0.031	0.054	0.020	0.082
Sindh	0.31	0.26	0.39	0.21
Northwest Frontier	0.16	0.22	0.17	0.24
Religion				
Muslim	0.91	0.96	0.89	0.98
Christian	0.031	0.007	0.030	0.008
Non-Muslim	0.058	0.033	0.080	0.017

Notes: See Notes to Appendix Table 1. [1]:Corresponds to the presence of a bus route through the cluster.

Social Protection Discussion Paper Series

No.	Title
0127	Generational Accounting and Hungarian Pension Reform by Róbert I. Gál, András Simonovits and Géza Tarcali
0126	Orphans and Other Vulnerable Children: What role for social protection? edited by Anthony Levine
0125	Child Farm Labour: The Wealth Paradox by Sonia Bhalotra
0124	What Can Be Done about Child Labor? An overview of resent research and its implications for designing programs to reduce child labor by Bjørne Grimsrud
0123	Measuring and Analyzing Child Labor: Methodological Issues by Bjørne Grimsrud
0122	Family-Controlled Child Labor in Sub-Saharan Africa-A Survey of Research by Jens Christopher Andvig
0121	Is Child Work Necessary? by Sonia Bhalotra
0120	The Cost and Benefits of Collective Bargaining: A Survey by Toke Aidt and Zafiris Tzannatos
0119	The Informal Sector Revisited: A Synthesis Across Space and Time by Niels-Hugo Blunch , Sudharshan Canagarajah and Dhushyanth Raju
0118	Social Services Delivery through Community-Based Projects by Dinah McLeod and Maurizia Tovo
0117	Earnings Inequality in Transition Economies of Central Europe Trends and Patterns During the 1990s by Jan J. Rutkowski
0116	Viewing Microinsurance as a Social Risk Management Instrument by Paul B. Siegel, Jeffrey Alwang and Sudharshan Canagarajah
0115	Vulnerability: A View from Different Disciplines by Jeffrey Alwang, Paul B. Siegel and Steen L. Jorgensen

Social Protection Discussion Paper Series continued

No.	Title
0114	Individual Accounts as Social Insurance: A World Bank perspective by Robert Holzmann and Robert Palacios
0113	Regulating Private Pension Funds' Structure, Performance and Investments: Cross-country Evidence by P.S. Srinivas, Edward Whitehouse and Juan Yermo
0112	The World Bank and the Provision of Assistance to Redundant Workers: Experience with Enterprise Restructuring and Future Directions by Yi Chen
0111	Labor Markets in Transition Economies: Recent Developments and Future Challenges by Mansoora Rashid and Jan Rutkowski
0110	A Review of Social Investment Fund Operations Manuals by Juliana Weissman
0109	Risk and Vulnerability: The Forward Looking Role of Social Protection in a Globalizing World by Robert Holzmann
0108	Australia's Mandatory Retirement Saving Policy: A View from the New Millennium by Hazel Bateman and John Piggott
0107	Annuity Markets and Benefit Design in Multipillar Pension Schemes: Experience and Lessons from Four Latin American Countries by Robert Palacios and Rafael Rofman
0106	Guide for Task Teams on Procurement Procedures Used in Social Funds by Jorge A. Cavero Uriona
0105	Programmes Actifs Pour Le Marche Du Travail: Un Aperçu General Des Evidences Resultant Des Evaluations by Zafiris Tzannatos and Amit Dar
0104	Kazakhstan: An Ambitious Pension Reform by Emily S. Andrews

Social Protection Discussion Paper Series continued

No.	Title
0103	Long-term Consequences of an Innovative Redundancy-retraining Project: The Austrian Steel Foundation by Rudolf Winter-Ebmer
0102	Community Based Targeting Mechanisms for Social Safety Nets by Jonathan Conning and Michael Kevane
0101	Disability and Work in Poland by Tom Hoopengardner
0024	Do Market Wages Influence Child Labor and Child Schooling? by Jackline Wahba
0023	Including the Most Vulnerable: Social Funds and People with Disabilities by Pamela Dudzik and Dinah McLeod
0022	Promoting Good Local Governance through Social Funds and Decentralization by Andrew Parker and Rodrigo Serrano
0021	Creating Partnerships with Working Children and Youth by Per Miljeteig
0020	Contractual Savings or Stock Market Development. Which Leads? by Mario Catalan, Gregorio Impavido and Alberto R. Musalem
0019	Pension Reform and Public Information in Poland by Agnieszka Chlon
0018	Worker Reallocation During Estonia's Transition to Market: How Efficient and How Equitable? by Milan Vodopivec
0017	How Poor are the Old? A Survey of Evidence from 44 Countries by Edward Whitehouse
0016	Administrative Charges for Funded Pensions: An International Comparison and Assessment by Edward Whitehouse
0015	The Pension System in Argentina: Six years after the Reform by Rafael Rofman and Buenos Aires

Social Protection Discussion Paper Series continued

No.	Title
0014	Pension Systems in East Asia and the Pacific: Challenges and Opportunities by Robert Holzmann, Ian W. Mac Arthur and Yvonne Sin
0013	Survey of Disability Projects. The Experience of SHIA, Swedish International Aid for Solidarity and Humanity by Kaj Nordquist
0012	The Swedish Pension Reform Model: Framework and Issues by Edward Palmer
0011	Ratcheting Labor Standards: Regulation for continuous Improvement in the Global Workplace by Charles Sabel, Dara O'Rourke and Archon Fung
0010	Can Investments in Emerging Markets Help to Solve the Aging problem? by Robert Holzmann
0009	International Patterns of Pension Provision by Robert Palacios and Montserrat Pallarès-Miralles
0008	Regulation of Withdrawals in Individual Account Systems by Jan Walliser
0007	Disability Issues, Trends and Recommendations for the World Bank by Robert L. Metts
0006	Social Risk Management: A New Conceptual Framework for Social Protection and Beyond by Robert Holzmann and Steen Jørgensen
0005	Active Labor Market Programs: Policy Issues for East Asia by Gordon Betcherman, Amit Dar, Amy Luinstra, and Makoto Ogawa
0004	Pension Reform, Financial Literacy and Public Information: A Case Study of the United Kingdom by Edward Whitehouse
0003	Managing Public Pension Reserves Part I: Evidence from the International Experience by Augusto Iglesias and Robert J. Palacios

Social Protection Discussion Paper Series continued

No.	Title
0002	Extending Coverage in Multi-Pillar Pension Systems: Constraints and Hypotheses, Preliminary Evidence and Future Research Agenda by Robert Holzmann, Truman Packard and Jose Cuesta
0001	Contribution pour une Stratégie de Protection Sociale au Bénin by Maurizia Tovo and Regina Bendokat

* The papers below (No. 9801-9818 and 9901-9934) are no longer being printed, but are available for download from our website at www.worldbank.org/sp

9934	Helping the Poor Manage Risk Better: The Role of Social Funds by Steen Jørgensen and Julie Van Domelen
9933	Coordinating Poverty Alleviation Programs with Regional and Local Governments: The Experience of the Chilean Social Fund – FOSIS by Jorge C. Barrientos
9932	Poverty and Disability: A Survey of the Literature by Ann Elwan
9931	Uncertainty About Children's Survival and Fertility: A Test Using Indian Microdata by Vincenzo Atella and Furio Camillo Rosati
9930	Beneficiary Assessment of Social Funds by Lawrence F. Salmen
9929	Improving the Regulation and Supervision of Pension Funds: Are there Lessons from the Banking Sector? by Roberto Rocha, Richard Hinz, and Joaquin Gutierrez
9928	Notional Accounts as a Pension Reform Strategy: An Evaluation By Richard Disney
9927	Parametric Reforms to Pay-As-You-Go Pension Systems by Sheetal K. Chand and Albert Jaeger
9926	An Asset-Based Approach to Social Risk Management: A Conceptual Framework by Paul Siegel and Jeffrey Alwang

Social Protection Discussion Paper Series continued

No.	Title
9925	Migration from the Russian North During the Transition Period by Timothy Heleniak
9924	Pension Plans and Retirement Incentives by Richard Disney and Edward Whitehouse
9923	Shaping Pension Reform in Poland: Security Through Diversity by Agnieszka Chlon, Marek Góra and Michal Rutkowski
9922	Latvian Pension Reform by Louise Fox and Edward Palmer
9921	OECD Public Pension Programmes in Crisis: An Evaluation of the Reform Options by Richard Disney
9920	A Social Protection Strategy for Togo by Regina Bendokat and Amit Dar
9919	The Pension System in Singapore by Mukul G. Asher
9918	Labor Markets and Poverty in Bulgaria by Jan J. Rutkowski
9917	Taking Stock of Pension Reforms Around the World by Anita M. Schwarz and Asli Demirguc-Kunt
9916	Child Labor and Schooling in Africa: A Comparative Study by Sudharshan Canagarajah and Helena Skyt Nielsen
9915	Evaluating the Impact of Active Labor Programs: Results of Cross Country Studies in Europe and Central Asia by David H. Fretwell, Jacob Benus, and Christopher J. O'Leary
9914	Safety Nets in Transition Economies: Toward a Reform Strategy by Emily S. Andrews and Dena Ringold
9913	Public Service Employment: A Review of Programs in Selected OECD Countries and Transition Economies by Sandra Wilson and David Fretwell

Social Protection Discussion Paper Series continued

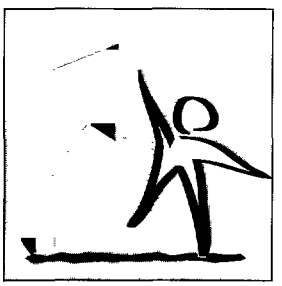
No.	Title
9912	The Role of NPOs in Policies to Combat Social Exclusion by Christoph Badelt
9911	Unemployment and Unemployment Protection in Three Groups of Countries by Wayne Vroman
9910	The Tax Treatment of Funded Pensions by Edward Whitehouse
9909	Russia's Social Protection Malaise: Key Reform Priorities as a Response to the Present Crisis edited by Michal Rutkowski
9908	Causalities Between Social Capital and Social Funds by Jesper Kammersgaard
9907	Collecting and Transferring Pension Contributions by Rafael Rofman and Gustavo Demarco
9906	Optimal Unemployment Insurance: A Guide to the Literature by Edi Karni
9905	The Effects of Legislative Change on Female Labour Supply: Marriage and Divorce, Child and Spousal Support, Property Division and Pension Splitting by Antony Dnes
9904	Social Protection as Social Risk Management: Conceptual Underpinnings for the Social Protection Sector Strategy Paper by Robert Holzmann and Steen Jorgensen
9903	A Bundle of Joy or an Expensive Luxury: A Comparative Analysis of the Economic Environment for Family Formation in Western Europe by Pierella Paci
9902	World Bank Lending for Labor Markets: 1991 to 1998 by Amit Dar and Zafiris Tzannatos
9901	Active Labor Market Programs: A Review of the Evidence from Evaluations by Amit Dar and Zafiris Tzannatos
9818	Child Labor and School Enrollment in Thailand in the 1990s By Zafiris Tzannatos

Social Protection Discussion Paper Series continued

No.	Title
9817	Supervising Mandatory Funded Pension Systems: Issues and Challenges by Gustavo Demarco and Rafael Rofman
9816	Getting an Earful: A Review of Beneficiary Assessments of Social Funds by Daniel Owen and Julie Van Domelen
~~9815~~	This paper has been revised, see Discussion Paper No. 9923
9814	Family Allowances by Suzanne Roddis and Zafiris Tzannatos
9813	Unemployment Benefits by Zafiris Tzannatos and Suzanne Roddis
9812	The Role of Choice in the Transition to a Funded Pension System by Robert Palacios and Edward Whitehouse
9811	An Alternative Technical Education System: A Case Study of Mexico by Kye Woo Lee
9810	Pension Reform in Britain by Edward Whitehouse
9809	Financing the Transition to Multipillar by Robert Holzmann
9808	Women and Labor Market Changes in the Global Economy: Growth Helps, Inequalities Hurt and Public Policy Matters by Zafiris Tzannatos
9807	The World Bank Approach to Pension Reform by Robert Holzmann
9806	Government Guarantees on Pension Fund Returns by George Pennacchi
9805	The Hungarian Pension System in Transition by Robert Palacios and Roberto Rocha
9804	Risks in Pensions and Annuities: Efficient Designs by Salvador Valdes-Prieto

Social Protection Discussion Paper Series continued

No.	Title
9803	Building an Environment for Pension Reform in Developing Countries by Olivia S. Mitchell
9802	Export Processing Zones: A Review in Need of Update by Takayoshi Kusago and Zafiris Tzannatos
9801	World Bank Lending for Labor Markets: 1991 to 1996 by Amit Dar and Zafiris Tzannatos



Summary Findings

This paper is motivated by the observation that children in land-rich households are often more likely to be in work than the children of land-poor households. The vast majority of working children in developing countries are in agricultural work, predominantly on farms operated by their families. Land is the most important store of wealth in agrarian societies and it is typically distributed very unequally. These facts challenge the common presumption that child labour emerges from the poorest households. We suggest that this seeming paradox can be explained by failures of the markets for labour and land. Credit market failure will tend to weaken the force of this paradox. We model these effects and estimate the model on data from rural Pakistan and Ghana. A striking finding of the paper is that, after controlling for household consumption and other covariates, the wealth paradox persists for girls but, for boys in both countries, it vanishes.

HUMAN DEVELOPMENT NETWORK

About this series...

Papers in this series are not formal publications of the World Bank. They present preliminary and unpolished results of analysis that are circulated to encourage discussion and comment; citation and the use of such a paper should take account of its provisional character. The findings, interpretations, and conclusions expressed in this paper are entirely those of the author(s) and should not be attributed in any manner to the World Bank, to its affiliated organizations or to members of its Board of Executive Directors or the countries they represent. For free copies of this paper, please contact the Social Protection Advisory Service, The World Bank, 1818 H Street, N.W., Room G8-138, Washington, D.C. 20433-0001. Telephone: (202) 458-5267, Fax: (202) 614-0471, E-mail: socialprotection@worldbank.org or visit the Social Protection website at www.worldbank.org/sp.