

Analysis of child labour in Peru and Pakistan: A comparative study

Ranjan Ray

School of Economics, University of Tasmania, GPO Box 252-85, Hobart, Tasmania 7001,
Australia (Fax: +61-3-6226-7587; e-mail: Ranjan.Ray@utas.edu.au)

Received: 24 August 1998/Accepted: 10 March 1999

Abstract. This paper analyses child labour participation and its key determinants using data sets from Peru and Pakistan. The results include tests of the 'Luxury' and 'Substitution' hypotheses that play key roles in recent studies on child labour and child schooling. The results reject both hypotheses in the context of child labour in Pakistan and suggest that income and related variables do not have the expected negative effect on children's work input. Rising wages of adult female labour in Pakistan, and falling adult male wage in Peru lead to increased participation of children in the labour market. The results on the combined country data formally establish the presence of strong individual country effects in the estimated regressions. For example, *ceteris paribus*, a Peruvian child is more likely to experience schooling than a Pakistani child. However, both countries agree on the positive role that adult female education and infrastructure investment in basic amenities can play in discouraging child labour and encouraging child schooling.

JEL classification: C2, D1, I3

Key words: Child labour, luxury axiom, substitution axiom

1. Introduction

In recent years, there has been a growing interest in child labour among academics, professionals and the media. There is almost universal agreement that

The research for this paper was supported by an Australian Research Council Large Grant (A79702841). I am grateful to Geoffrey Lancaster for skilful and painstaking research assistance. Helpful comments from Kaushik Basu and two anonymous referees on an earlier version are, also, gratefully acknowledged. The disclaimer applies. *Responsible editor:* Klaus F. Zimmermann.

child labour is undesirable but wide disagreement on how to tackle this problem. Though the ILO (1996)'s estimates on labour force participation rates for children aged 10–14 years show a declining trend, in absolute terms the size of the child labour force currently is and will continue to be large enough to be of serious concern. Though the Industrial Revolution in Europe with images of large numbers of children working in factories is usually viewed as the starting point for child labour, its origin can be traced back still earlier to the pre industrial era¹. Historians have maintained that child labour probably peaked during the expansion of the domestic season which preceded the Industrial Revolution. Although child labour was not an invention of the Industrial Revolution, the changes it inaugurated ensured that for the first time children were economic factors in the system. Awareness of the harmful effects of child labour first occurred in industrialised countries during the last century. As Fyfe (1989) points out, child labour was reduced and then virtually eliminated in these countries by the early part of this century through a combination of economic changes, which decreased the demand for child workers, and the introduction of universal schooling, which absorbed the supply of children for work.

In contrast, in contemporary times, the phenomenon of child labour is associated almost exclusively with the developing countries. While Asia has the largest number of child workers in the world, the highest proportion of child workers in relation to the total child population is to be found in Africa. According to Fyfe (1989), as many as 20% of African children are working with child workers constituting as much as 17% of the workforce in some African countries. This is confirmed by ILO (1996) which estimates the participation rates for children, aged 10–14 years, in 1995 to be 26.23% in Africa, 12.77% in Asia, and only 0.06% in Europe. In Latin America, with a corresponding participation rate of 9.77%, the problem of child labour is on a smaller, but by no means insignificant, scale. Latin America also has the highest incidence of children working in the urban informal sector. Though most working children are still found in the rural areas, it is rapid urbanisation that gives rise to growing international concern because of its association with work outside of the family context.

Notwithstanding its long history, child labour has attracted international awareness and concern only recently. It was during the 'International Year of the Child' in 1979 that international attention became fully focussed for the first time on the issue of child labour. Professor Abdelwahab Boudhiba, who produced the first report on child labour for the UN, found that 98% of working children are in the developing world (Boudhiba 1982). Child labour not only remains economically important in the developing countries but it is on the whole as morally unquestioned as was the case in Britain before the end of the eighteenth century.

There has been, in recent years, a rapidly expanding analytical and empirical literature on Child Labour (see Grootaert and Kanbur 1995, Basu 1998 for surveys). While some of these studies (for example, Knight 1980; Horn 1995) discussed mainly the qualitative features of child labour, the recent literature has focussed attention on the quantitative aspects taking advantage of the increasing availability of good quality data on child employment. The initiative in quantifying child labour came from the ILO which produced international statistics based on the definition of a child as someone under the age of 15 (Ashagrie 1993). There has, however, been wide divergence between

alternative sources on the magnitude of child labour. For example, while the ILO estimated child labour to be 52 million children in 1979, rising to 78.5 million in 1990, the Anti Slavery Society (1985, p. 17) put the figure at 100 million in 1985. Professor Boudhiba suggested in his report to the UN in 1982 that 145 million working children between the ages of 10 and 14 was more realistic. In contrast, UNICEF (1991) estimated the number of working children to be 80 million. Such wide variation between alternative estimates largely reflect differences in the definition of Child Labour. For example, the ILO does not regard cooking, cleaning, child care and other domestic duties as child labour, since such duties are undertaken to some extent by children in all societies². It can be argued, however, that domestic work, as it has been defined, becomes 'social exploitation' if it denies children their right to play, to learn and to enjoy a normal childhood. This argument suggests that the ILO figures underestimate the true extent of child labour. In particular, the ILO methodology biases downwards the estimate of female child labour since boys tend to be less involved than girls in domestic work, for example, in child care. Domestic work is not only an unrecognised form of economic contribution, it remains unappreciated as a form of child labour.

Within the empirical literature on child labour, there has been a shift in emphasis from mere quantification to an econometric analysis of its determinants. This has coincided with a widespread realisation that simply banning child labour is unlikely to eradicate this phenomena and may even be counterproductive. As Knight (1980, p. 17) notes, "when child labour is prohibited by law, the law cannot protect child workers since they legally do not exist". An understanding of the key determinants of child labour is necessary for formulation of effective policies in reducing and eventually eliminating child labour. This view underlines the recent econometric analyses of child labour on micro data sets of developing countries. Examples include Psacharopoulos' (1997) study on Bolivia and Venezuela, Patrinos and Psacharopoulos (1997) on Peru, and Jensen and Nielsen (1997) on Zambia. The present exercise is in this tradition. Besides using the logit model in the estimation, these studies attach importance to the schooling variable in their analysis of child labour. Following Becker (1965), Rosenzweig and Evenson (1977), and Chernichovsky (1985), there is now widespread appreciation that decisions on fertility, child labour and child schooling are interdependent (see Bhatti (1998) for a survey of field investigations in India on child labour and child schooling with special attention to their interaction). Basu and Van (1998) show, via their analytical formulation, the interrelation between adult and child labour markets. The results in the Basu and Van analysis derive from two Axioms which they refer to as the 'Luxury' and 'Substitution Axioms'. These, referred to as 'Hypothesis' here, have been stated as follows:

*Luxury Hypothesis*³: A family will send the children to the labour market only if the family's income from non-child labour sources drops very low.

Substitution Hypothesis: Child labour and Adult labour are substitutes.

To the best of my knowledge, these Hypotheses have not been econometrically tested before. We do so on Peruvian and Pakistani data on child labour. These countries provide an interesting comparison because of their geographical distance from each other, besides their cultural and economic diversity. The interrelation between child labour, child schooling and adult

labour is incorporated by including adult wages as determinants of child participation in employment and schooling. The present exercise extends the empirical literature on the determinants of child labour and child schooling in the following respects:

- i) We propose and apply a simple test of the 'Luxury Hypothesis'. The poverty status of a household is included in the list of determinants in the child labour and child schooling regressions. The sign and magnitude of the estimated coefficient of the 'poverty status' variable in the logit regression allows us to examine the hypothesis, implicit in Basu and Van's 'Luxury Axiom', that parents send their children to work and/or keep them from school only if the household income falls below a poverty line threshold. In other words, this Hypothesis predicts that a large change in the probability of child labour/schooling will occur at the point the household crosses the poverty line. If the 'poverty status' variable takes the form of a 1 (poor), 0 (non poor) dummy, then the corresponding regression coefficient shows the impact on the log odds ratio of child labour/schooling if the household crosses the poverty line. A small and statistically insignificant estimate of this coefficient is, therefore, inconsistent with the 'Luxury Hypothesis'. Basu (1998, p. 26–28) contains an assessment of the idea of parental altruism towards children that underlines the 'Luxury Hypothesis'.
- ii) The inclusion of adult male and adult female wages as regressors in the child labour and child schooling participation regressions provides evidence on the nature of interrelation between child labour, child schooling and adult labour. The sign of the estimated coefficients of adult wages in the child labour regressions tell us whether child and adult labour are 'substitutes' as Basu and Van (1998)'s 'substitution hypothesis' asserts, or 'complements' as Galbi (1997)'s account of employment in English cotton factories in the 1830's suggests. The assumption of "some substitutability in production between adult and child labour" plays a crucial role in the Basu and Van analysis of equilibria in adult and child labour markets, and of conditions under which a ban on child labour may be desirable. The evidence on substitutability or otherwise between adult and child labour is, therefore, of considerable policy significance. The results, presented later, also point to the need to distinguish between male and female adult labour since the nature of their interaction with child labour is qualitatively quite different.
- iii) A comparison between the nature and determinants of child labour in Peru and Pakistan is a key motivation of our study. Child labour takes different form in different regions. Cross country comparisons, especially involving different cultures and continents, enable better understanding of differences in the policies required to maximise their effectiveness in specific regional contexts. We observe some interesting dissimilarities between the results of the Peruvian and Pakistani regressions. The results also share some common features, for example, the significant role that adult female education can play in each country in reducing child labour and increasing child schooling. The individual country effects in the estimated regressions are formally tested by pooling data across the two countries with respect to comparable variables. The regressions on the combined country data provide a convenient unified framework for test-

ing for individual country effects, and of their interaction with key individual, family and socioeconomic characteristics.

- iv*) The role of community infrastructure in influencing child labour and child schooling is examined by including community variables, besides a child's personal and family characteristics, in the estimating regressions. The results here are of considerable practical significance since, if the community effects prove significant⁴, they provide additional instruments in devising effective policies that improve child welfare. In case of Pakistan (the lack of price information prevented a similar exercise for Peru), we additionally exploit price data to, also, examine the effects of price movements on child labour and child schooling.

The rest of this paper is organised as follows. Section 2 describes the data sets, and compares the child participation rates in employment and schooling between Peru and Pakistan. Section 3 is divided into two subsections. Section 3.1 reports and discusses the individual country regressions on child participation. Section 3.2 discusses the regression results on pooled data combining the individual country samples and reports the results of our test of the hypothesis that there are no country specific factors in the regression relationships. We end on the concluding note of Sect. 4.

2. The data sets and their principal features

The child labour data for this study came from the Peru Living Standards Measurement Survey in 1994 (PLSS) and the Pakistan Integrated Household Survey in 1991 (PIHS). These surveys were conducted jointly by the respective governments and the World Bank as part of the Living Standards Measurement Study (LSMS) household surveys in a number of developing countries (see Grosh and Glewwe (1995) for an overview and general description of the LSMS data sets). The purpose of the LSMS surveys is to provide policy makers and researchers with individual, household and community level data needed to analyse the impact of policy initiatives on living standards of households. The Pakistan Integrated Household Survey was carried out in 1991 when PIHS teams visited 4800 households residing in 300 urban and rural communities between January and December 1991. The Peru Living Standards Survey covered 3623 households. While the Peruvian sample contained information on child labour and child schooling of 5231 children aged 6–17 years, the Pakistani data set yielded 5867 observations on children aged 10–17 years. Note, incidentally, that though, on ILO based definition, a working child aged 15 years or above does not constitute child labour, we follow conventional practice in extending the age limit to 17 years in order to capture better the interaction between child schooling and child labour.

Tables 1 and 2 present the age specific participation rates of Peruvian and Pakistani children, respectively, in the labour market and in schooling. The following remarks apply. First, in both countries, the child participation rate in the labour market increases with child age. In case of child schooling, the participation rate peaks around 9 years in Peru, and 11 years in Pakistan, and then falls. Second, the gender picture is similar between the two countries with respect to child labour with boys registering a higher participation than girls. However, the situation differs sharply with respect to child schooling with the

Table 1. Participation rates (in percentages) of Peruvian children in employment and in schooling

Age	Employment			Schooling		
	Boys	Girls	Overall	Boys	Girls	Overall
6	7.9	11.6	9.6	90.5	89.3	89.9
7	12.9	11.8	12.4	93.1	94.6	93.8
8	17.6	11.6	14.3	95.5	95.9	95.7
9	18.5	17.1	17.8	98.1	99.5	98.8
10	29.4	22.1	25.8	97.2	97.1	97.2
11	31.8	21.7	27.0	98.3	96.7	97.5
12	37.7	27.0	32.2	95.5	94.8	95.1
13	32.0	27.3	29.5	96.1	88.1	91.9
14	48.7	32.4	40.6	89.3	90.1	89.7
15	51.8	32.7	42.2	88.2	83.2	85.7
16	46.1	34.9	40.4	82.7	74.4	78.5
17	57.1	27.9	42.6	63.9	58.7	61.3
ALL	31.8	22.7	27.3	90.9	89.0	90.0

Table 2. Participation rates (in percentages) of Pakistani children in employment and in schooling

Age	Employment			Schooling		
	Boys	Girls	Overall	Boys	Girls	Overall
10	14.9	18.7	16.7	77.3	51.1	64.5
11	16.1	19.6	17.7	82.2	54.8	69.6
12	25.4	22.8	24.2	73.5	49.0	62.4
13	30.3	21.3	25.6	72.1	45.3	58.1
14	36.3	28.3	32.2	66.8	39.0	52.6
15	39.8	29.8	35.0	56.9	33.4	45.7
16	51.2	26.7	39.0	50.7	28.1	39.4
17	48.4	25.8	38.9	48.8	28.2	40.1
ALL	31.3	23.9	27.8	67.2	42.2	55.2

Peruvian sample showing a more even gender balance in the participation rate between boys and girls, in contrast to the Pakistani sample. In the latter, in the later age groups of 14–17 years, the participation rate of Pakistani girls in schooling falls to nearly half that of boys. Chernichovsky's (1985) observation on Rural Botswana that "girls are more likely than boys to be enrolled in school and stay there longer . . . parents are thus more inclined to educate their daughters" (p. 327) does not, therefore, extend to the Pakistani sample. Third, the schooling participation rates of Peruvian children in all age groups are consistently higher than their Pakistani counterparts, with the former registering figures greater than 80% until 15 years which is the lower limit for children to be officially in employment. In case of Pakistan, the participation rate rarely goes above 65%, and falls off sharply for children, especially girls, beyond 13 years. This suggests that in the age group 10–14 years, while the Peruvian children tend to combine schooling with employment, in Pakistan

children drop out of schooling completely to participate in the labour market. Fourth, the labour force participation rates of Peruvian and Pakistani children are unrepresentative of their continents since they are sharply higher than the figures of 11.23% and 15.19%, reported by ILO (1996) for Latin America and Asia, respectively, in 1990, the closest year to our survey period. This is consistent with the fact that Peru and Pakistan are among the most impoverished nations in their respective regions.

3. Econometric estimates

3.1. *The individual country estimates on child participation*

Table 3 presents the estimates of the coefficients in the logit regression of child labour on its various determinants in the two countries. For comparability with Pakistan, we estimated the Peruvian regressions only on children in the age group 10–17 years. To examine the sensitivity of the stochastic error structure, we also estimated the corresponding Probit regressions. The Probit results, reported in Ray (1998b), show that the conclusions are invariant between the logit and probit models.

There are some interesting similarities and dissimilarities between the Peruvian and Pakistani results. The direction and statistical significance of the impact of 'child gender', 'age of child', and the level of female education in the household are similar between the two countries. In both countries, the probability of a girl engaged in child labour is more than that of a boy. Child age exhibits non linearity in its effect on child employment via significance of the 'age square' coefficient. Consistent with the results of previous studies, we find in both countries that an increase in female education in a household tends to reduce the likelihood of children in that household entering the labour market. The coefficient of the household expenditure variable is negative and highly significant in Peru, but insignificant in Pakistan. Following McGregor and Barooah (1992) and Slesnick (1994), we argue that aggregate consumption expenditure is a more appropriate indicator of economic well being than income. Another significant dissimilarity between the two countries relates to the impact of 'culture', as measured by the language spoken in the household, on the child's labour force participation. In Peru, children from minority ethnic/language groups, conditional on other characteristics being the same, are *more* likely to work, while the exact reverse is indicated for Pakistan.

The impact of the 'poverty status' variable on a child's labour force participation is of particular interest in this study. The statistical insignificance of the poverty coefficient suggests that, contrary to the prediction of the Luxury Hypothesis, no significant change in the probability of child employment occurs in either country when a household crosses the poverty line (The poverty line was set at 50% of the sample median expenditure). The strong rejection by the Pakistani data of any direct link between economic deprivation and child labour, as reflected in the statistical insignificance of both the poverty and expenditure coefficients, is consistent with the observation of Bhatta (1998) who cites a variety of empirical studies on Indian child labour in support of the view that "income and related variables do not seem to have any direct significant effect on children's work input ... it is not a financial

Table 3. Logit estimates^a of child labour participation^b equation

Variable	Coefficient estimates ^c	
	Peru	Pakistan
Constant	-530.16 ^e (176.25)	-474.27 ^e (145.05)
<i>Child characteristics</i>		
Age of Child	75.051 ^e (26.037)	75.585 ^e (20.944)
(Age of child) ²	-2.099 ^d (0.962)	-2.117 ^e (0.776)
Child gender (0 = boy, 1 = girl)	-89.991 ^e (9.010)	-108.970 ^e (7.861)
Years of schooling	19.175 ^d (8.727)	-1.277 (2.133)
Currently enrolled in school (0 = no, 1 = yes)	-70.464 ^e (14.481)	-173.860 ^e (11.354)
Ability to write (0 = no, 1 = yes)	-8.971 (21.278)	-11.980 (12.321)
<i>Family characteristics</i>		
Poverty status (1, if below poverty line, 0, otherwise)	-4.235 (13.544)	7.142 (7.391)
Expenditure per equivalent adult	-0.010 ^e (0.003)	-0.00008 (0.00006)
Region of residence (1 = urban, 0 = rural)	-147.14 ^e (12.334)	-91.666 ^e (9.933)
No. of children	4.421 (2.633)	0.576 (1.344)
No. of adults	-8.328 ^d (3.683)	-7.952 ^e (1.937)
Gender of household head (0 = male, 1 = female)	0.100 (13.904)	12.560 (24.837)
Age of household head	-0.485 (0.447)	0.002 (0.307)
Language spoken by household head (1 = Dominant ^f language, 2 = Others)	45.901 ^e (9.875)	-32.178 ^e (9.50)
Years of education of most educated female member	-17.828 ^e (4.478)	-5.502 ^e (1.302)
Maximum wage earned by the male members	-0.797 ^e (0.273)	-0.189 (0.269)
Maximum wage earned by the female members	1.225 (0.755)	8.139 ^e (0.980)
(Max. female wage) ²	-0.006 (0.012)	-0.102 ^e (0.020)
<i>Community characteristics</i>		
Water storage (1 = best, 6 = worst)	-1.640 (2.820)	6.133 ^e (2.001)
Disposal of sewerage (1 = best, 6 = worst)	14.052 ^e (3.121)	4.805 (3.888)
Electricity (1 = yes, 0 = no)	5.333 (7.480)	1.590 (15.249)
Quality of water supply (1 = good, 0 = contaminated)	-5.082 (8.968)	-

Table 3 (continued)

<i>Prices</i>		
Price of atta (Superior)	–	–0.029 (0.112)
Price of atta (Inferior)	–	–7.366 ^e (2.348)
Price of rice (Inferior)	–	3.495 (2.382)
Price of tea	–	0.341 (0.839)
Price of milk	–	–6.080 ^e (2.158)
Price of mutton	–	0.029 (0.756)
Maddala R^2	0.282	0.250
Cragg Uhler R^2	0.388	0.361
McFadden R^2 (Adjusted for degrees of freedom)	0.251	0.240
Log Likelihood	–1625.1	–2618.1
Chi-Square	$\chi^2_{22} : 1118.20^e$	$\chi^2_{27} : 1689.62$
No. of Observations	3379	5867

^a Standard Errors in brackets.

^b The dependent variable takes the value 0 if the child does not work, 1 if she/he works.

^c All the coefficient estimates and their standard errors have been multiplied by 100.

^d Significant at 5% level

^e Significant at 1% level.

^f The dominant language spoken is Spanish in case of Peru, Urdu/Punjabi in case of Pakistan.

imperative that forces children to work ... children are often put to work as a deterrent to idling rather than as an economic necessity” (p. 1734). In contrast to Pakistan, the statistical significance of the estimated expenditure coefficient in Peru provides some support to the idea of a link between economic circumstances and child labour, though the Luxury Hypothesis is not supported here as well.

Of further interest in these results are the sign and magnitude of the coefficients of the adult wage variables. Following the observation of Basu (1993) based on some slum dwellers outside New Delhi, we allow the possibility of non linearity in the relationship between child labour and adult female wages through the presence of the squared female wage variable on the right hand side in the logit regressions. Sharp differences exist between the Peruvian and Pakistani results. In Peru, a rise in adult male wage exerts a significantly negative impact, while in Pakistan a rise in adult female wage exerts a significantly positive impact on a household’s propensity to put its children into employment. In other words, while adult male and child labour are ‘substitutes’ in the Peruvian household, adult female and child labour are ‘complements’ in the case of Pakistan. The negative and significant estimate of the coefficient of the squared female wage variable in Pakistan suggests that the positive effect of rising adult female wages on a child’s labour force participation weakens in the higher wage categories. In contrast, Pakistani

adult male wages do not have any impact on child employment. The results suggest that while the link between adult female and child labour markets is much stronger in Pakistan than in Peru, the reverse is true in the case of adult male labour. The complementarity between adult female and child labour, witnessed in Pakistan, would appear to be inconsistent with the idea of parental altruism that underlies the 'Substitution Hypothesis', namely, that mothers will reduce their children's work involvement if their own wage conditions improve. The South Asian experience, illustrated by the Pakistani evidence, suggests the reverse – if adult female wages rise, mothers will tend to take their children, daughters in most cases, increasingly with them to work. This may, also, reflect the lack of good schools and child care facilities in Pakistan, unlike in Peru, rather than simply non-altruistic parental behaviour on the part of Pakistani women⁵.

The overall message, that the estimated coefficients of the wage variables convey, is that it is important to distinguish between the adult male and the adult female in modelling the interaction between the adult and child labour markets.

Of the remaining determinants of child employment, those that are of particular interest are the community variables in both countries and, additionally, prices in Pakistan. Improved sewerage disposal in Peru, and improved water storage in Pakistan reduce the likelihood of child labour. The results are of significance since they point to the close causal link between a deteriorating community infrastructure and rising child labour, and suggest some effective policy instruments in eliminating child employment in the long run. The strong statistical significance of some of the price coefficients in Pakistan, also, points to the close link between child labour and commodity markets, though not necessarily in the expected direction. The estimates show that the items Atta (inferior class) and Milk are strong price inelastic complements of child labour in Pakistan. Large price increases in these essential items induce, via a fall in real household income, increased work participation of adult males and a consequent substitution of child by adult male labour.

Table 4 presents the coefficient estimates in the logit regressions of child schooling participation in the two countries. A gender differential exists in favour of boys' schooling in both countries, with the estimated coefficients showing a much stronger bias in Pakistan than in Peru. In both countries, a working child tends to miss out on school enrolment, with the trade off between schooling and employment proving to be stronger in Pakistan than in Peru. Both countries agree that improving adult female education in the household leads to an increased probability of schooling for its children. In contrast to the results on child labour, the statistical significance of the coefficient of the poverty variable in Pakistan provides some support for the 'Luxury Hypothesis' in the context of schooling for Pakistani children. In other words, a significant increase does occur in the probability of a Pakistani child's school enrolment when the household crosses the poverty line. The Peruvian evidence, however, shows no such significance. The impact of 'culture', as measured by the 'language' variable, on school enrolment is similar to that on child labour noted earlier. Children from minority linguistic groups are more likely, than from the majority groups, to be enrolled in schooling in Peru, the reverse being true in Pakistan. With the exception of male wages in Pakistan, improved wages do not have any statistically significant impact on the chances of a child's school enrolment.

Table 4. Logit estimates^a of child schooling participation^b equation

Variable	Coefficient estimates ^c	
	Peru	Pakistan
Constant	-38.280 (287.86)	38.065 (131.890)
<i>Child characteristics</i>		
Age of child	81.431 ^d (40.989)	47.020 ^d (18.984)
(Age of child) ²	-4.886 ^e (1.458)	-2.557 ^e (0.710)
Child gender (0 = boy, 1 = girl)	-68.073 ^e (12.960)	-162.740 ^e (6.870)
Currently employed (0 = no, 1 = yes)	-70.615 ^e (13.926)	-178.520 ^e (7.980)
<i>Family characteristics</i>		
Poverty status (1, if below poverty line, 0, otherwise)	-18.673 (17.941)	-60.313 ^e (7.070)
Expenditure per equivalent adult	-0.003 (0.004)	0.0001 (0.00009)
Region of residence (1 = urban, 0 = rural)	13.846 (17.616)	-14.577 (8.958)
No. of children	-0.146 (3.479)	-3.038 ^d (1.222)
No. of adults	-6.084 (4.879)	7.365 ^e (1.759)
Gender of household head (0 = male, 1 = female)	12.996 (19.15)	-3.950 (23.055)
Age of household head	-0.482 (0.588)	-0.501 (0.287)
Language spoken by household head (1 = Dominant ^f language, 2 = Others)	123.600 ^e (15.544)	-43.834 ^e (8.902)
Years of education of most educated female member	44.971 ^e (6.693)	9.960 ^e (1.024)
Maximum wage earned by the male members	0.722 (0.391)	1.134 ^e (0.242)
Maximum wage earned by the female members	1.647 (1.082)	1.328 (0.979)
(Max. female wage) ²	-0.020 (0.017)	-0.045 ^d (0.020)
<i>Community characteristics</i>		
Water storage (1 = best, 6 = worst)	-12.314 ^e (3.940)	-6.231 ^e (1.923)
Disposal of sewerage (1 = best, 6 = worst)	-4.821 (4.547)	-9.799 ^e (3.421)
Electricity (1 = yes, 0 = no)	-28.311 ^e (9.921)	3.679 (16.023)
Quality of water supply (1 = good, 0 = contaminated)	2.228 (12.364)	

Table 4 (continued)

<i>Prices</i>		
Price of atta (Superior)	–	–0.203 (0.131)
Price of atta (Inferior)	–	–5.523 ^e (1.970)
Price of rice (Inferior)	–	7.599 ^e (2.206)
Price of tea	–	2.717 ^e (0.775)
Price of milk	–	–2.929 ^d (1.464)
Price of mutton	–	–0.393 (0.717)
Maddala R^2	0.182	0.295
Cragg Uhler R^2	0.344	0.394
McFadden R^2 (Adjusted for degrees of freedom)	0.262	0.251
Log likelihood	–932.85	–3010.1
Chi-Square	$\chi^2_{20} : 679.045^e$	$\chi^2_{25} : 2048.67^e$
No. of Observations	3379	5867

^a Standard Errors in brackets.

^b The dependent variable takes the value 0 if the child does not attend school, 1 if she/he does.

^c All the coefficient estimates and their standard errors have been multiplied by 100.

^d Significant at 5% level

^e Significant at 1% level.

^f The dominant language spoken is Spanish in case of Peru, Urdu/Punjabi in case of Pakistan.

The significant impact of several of the community characteristics, notably improved water storage in both countries, the presence of electricity in Peru and of improved sewerage disposal in Pakistan, on child schooling reiterate the importance of such variables noted earlier in the discussion on child labour. Improvement in social infrastructure and living conditions provide effective means of increasing school enrolments. The significance of several of the price coefficients in the Pakistani results points to a strong link between price movement and child schooling. Rice (Inferior) and Tea are substitutes of child schooling, unlike Atta (Inferior), which appears to have a complementary relationship with the child's education.

3.2. The results on combined country data

Table 5 presents the coefficient estimates in the logit regressions of child labour and child schooling participation on the combined country data obtained by pooling information on comparable variables in the two countries' data sets. The individual country effects are allowed through a dummy variable, which takes the value 0 for Pakistan, 1 for Peru. In addition, the regression includes interaction effects of the country dummy with the community variables and with the 'poverty status' of the household.

Table 5. Logit regression estimates^a of child labour and child schooling participation^b equations on combined country data

Variable	Coefficient estimates ^c	
	Child labour	Child schooling
Constant	-504.19 ^e (107.95)	-171.02 (107.81)
<i>Child characteristics</i>		
Age of child	74.452 ^e (16.039)	90.419 ^e (16.096)
(Age of child) ²	-2.060 ^e (0.593)	-4.31 ^e (0.598)
Child gender (0 = boy, 1 = girl)	-101.76 ^e (5.74)	-130.15 ^e (5.78)
Currently enrolled in school (0 = no, 1 = yes)	-170.18 ^e (8.88)	—
Ability to write (0 = no, 1 = yes)	-24.734 ^e (8.14)	—
Currently employed (0 = no, 1 = yes)	—	-169.84 ^e (7.50)
<i>Family characteristics</i>		
Poverty status (1, if below poverty line, 0, otherwise)	15.678 ^d (6.94)	-73.41 ^e (6.36)
Region of residence (1 = urban, 0 = rural)	-127.73 ^e (7.68)	-14.925 (7.87)
No. of children	0.695 (1.14)	-4.80 ^e (1.10)
No. of adults	-10.327 ^e (1.63)	11.138 ^e (1.55)
Gender of household head (0 = male, 1 = female)	16.164 (11.186)	-0.163 (13.47)
Age of household head	-0.100 (0.246)	-0.611 ^d (0.250)
<i>Community characteristics</i>		
Water storage (1 = best, 6 = worst)	5.99 ^d (2.990)	-7.94 ^e (2.80)
Disposal of sewerage (1 = best, 6 = worst)	1.39 (2.76)	-18.055 ^e (2.51)
Electricity (1 = yes, 0 = no)	-1.39 (14.87)	12.755 (15.233)
<i>Country and its interaction effects</i>		
Country (1 = Peru, 0 = Pakistan)	1.14 (27.991)	95.422 ^e (30.053)
(Country) (Water storage)	-10.479 ^d (4.37)	-5.91 (4.96)
(Country) (Disposal of sewerage)	18.93 ^e (4.09)	20.05 ^e (5.14)
(Country) (Electricity)	-48.917 ^d (19.247)	63.27 ^e (22.79)
(Country) (Poverty status)	21.597 (12.544)	78.388 ^e (15.623)
(Country) (Currently enrolled in school)	113.59 ^e (14.81)	—
(Country) (Currently employed)	—	74.803 ^e (14.11)

Table 5 (continued)

Maddala R^2	0.246	0.301
Cragg Uhler R^2	0.347	0.419
McFadden R^2	0.228	0.281
(Adjusted for degrees of freedom)		
Log Likelihood	-4369.8	-4205.1
Chi-Square	$\chi^2_{20} : 2605.61^e$	$\chi^2_{19} : 3312.58^e$
No. of Observations	9246	9246

^a Standard Errors in brackets.

^b The dependent variable takes the value 0 if the child does not participate, 1 otherwise.

^c All the coefficient estimates and their standard errors have been multiplied by 100.

^d Significant at 5% level

^e Significant at 1% level.

The following points are worth noting. First, in both absolute magnitude and in statistical significance, the estimated coefficient of the ‘poverty status’ variable provides much greater support to the Luxury Hypothesis in the context of child schooling than in the case of child labour. It is important to stress, however, that unlike in the individual country results, presented in Table 3, the combined country regression does find the poverty coefficient significant at 5% significance level. In other words, the combined country data provides support to the idea that a household’s propensity to put its children into employment is significantly reduced when it crosses the poverty line from below, ie ceases to be ‘poor’. Similarly, and consistent with the individual country evidence presented in Table 4, the combined country data finds that a child in a non poor household is much more likely to be enrolled in schooling than one from a ‘poor’ household. Second, the age and gender of a child have significant effects on both child employment and child schooling – for example, an older child is much more likely to be in employment than one in the younger age group. Girls are more likely than boys to miss out on schooling. The importance of this result is clear for it suggests that policies aimed at taking children out of paid employment and sending them to schools, instead, should target the older girls. Third, the trade off between child employment and child schooling, reflected in the negative, and highly significant coefficient estimates of the corresponding variables, confirm that a child’s labour market participation presents the biggest obstacle to her school enrolment. Alternatively, improvement in the child’s schooling opportunities through the provision of good schools and increased access to them, is one of the most effective ways of combating child labour. This is confirmed by the negative and highly significant estimate of the ‘ability to write’ variable in the child labour regression. An improvement in the child’s literacy and writing skills encourages a child’s parents to keep her out of the labour market. Fourth, the community variables exert significant impact on child participation in employment and in schooling directly and/or through their interaction effects with the country dummy. Between the two variables of child behaviour, child schooling seems to be more sensitive to the community infrastructure variables. Improved water storage facilities and sewerage disposal, for example, significantly increase the probability of a child’s school

Table 6. Testing for community infrastructure effects and country effects on child participation

Hypothesis	Chi-Square Values ^a	
	Child Labour	Child Schooling
Community infrastructure effects	167.4 ^b (3)	419.8 ^b (3)
Country effects	407.6 ^b (6)	1529.0 ^b (6)

^a Figures in brackets denote degrees of freedom.

^b Significant at 1% level.

enrolment. Fifth, with an increase in the number of adults, a household is less likely to put its children into employment and more likely to keep them enrolled in schooling. In other words, the extended family system, a feature of these two countries, provides some form of insurance in keeping children away from the labour markets. With the gradual demise of the extended family as an institution, and the rise of the nuclear family to take its place, the vulnerability of a child to entering the labour market at the cost of her education has increased sharply. Sixth, the significance of several of the individual country effects, including that of the interaction effects, reject the idea that the regression relationships are invariant across countries. The positive and statistically significant estimated coefficient of the 'Country' variable in the schooling regression shows that, *ceteris paribus*, a Peruvian child is more likely to experience schooling than a Pakistani child. This reflects the lack of good schools in Pakistan which, as seen earlier, leads to an unlikely complementary relationship between adult female and child labour.

The presence of community infrastructure effects on child labour and of specific country effects in the estimated regressions is formally established on the chi-square values reported in Table 6. These show an overwhelming rejection of the hypothesis of no such effects using likelihood based chi-square tests. In other words, notwithstanding strong inter-country differences in the regression relationships, the combined country data confirms that community infrastructure variables provide effective policy instruments in influencing child participation in employment and in schooling.

4. Conclusions

There exist several differences between Peruvian and Pakistani children on their record of employment and schooling. The most significant of these is that, while Peruvian working children tend to combine employment with schooling, Pakistani children, especially older girls, drop out of schooling completely to participate in the labour market. The school enrolment rates of Peruvian children are considerably higher and show a more even gender balance than those in Pakistan.

This paper proposes and applies a simple test of the 'Luxury Hypothesis' on child labour and on child schooling. This Hypothesis plays a key role in recent theoretical analyses of child labour. The idea of parental altruism,

underlying this Axiom, namely that only poor parents send their children to work is rejected on Pakistani evidence, though weak support exists on Peruvian data and on pooled data that combined the individual country observations. More generally, and consistent with recent field investigations on child labour in South Asia, this study finds that income and related considerations do not have much of an effect on children's work input. In contrast, and in an interesting result, this study finds that community variables have significant effects on child labour – increased provision of public services leading to improved 'quality' of life discourage a household from putting its children into outside paid employment, and encourage their school enrolment. Moreover, in both countries and more so in Pakistan, increased education of adult females leads to a significant reduction in child labour. The policy significance of these results is obvious – strong policy initiatives in the field of female education aimed at increasing awareness, coupled with increased infrastructural investment in basic amenities, eg provision of water and electricity, are likely to be effective in reducing a household's reliance on child labour and in increasing child schooling. It is worth recalling that the rapid advances made in Europe and elsewhere in the early part of this century in the sphere of child labour and child schooling coincided with rapid strides in female education and awareness, and with vast improvements in the public provision of basic services and in the 'quality' of life.

The results of this study also show that the interaction between adult male and child labour is qualitatively quite different from that between adult female and child labour. The Pakistani evidence provides little support for the 'Substitution Hypothesis' that has figured in the recent analytical treatment of child labour, with rising adult female wages leading to increased participation of children in the labour market. A comparison of the results from the two countries suggests that the provision of satisfactory child care facilities and good schools will help to break the close nexus between the adult female and child labour markets, witnessed in Pakistan, and reverse the perverse complementary relationship between them.

Endnotes

- ¹ See, for example, Horn (1995). See, also, Galbi (1997) for an interesting account of how in the early 1830s. "from an initial division of labour strongly skewed toward children, the factories produced a new adult work force from their child workers" (p. 373).
- ² See Blanchard (1983, p. 18). More generally, the literature uses interchangeably the terms 'child work' and 'child labour'. Fyfe (1989) argues that this is confusing, and defines child labour as "work which impairs the health and development of children" (p. 4).
- ³ See Bonnet (1993), Jensen and Nielsen (1997) for an extension of the Luxury Hypothesis from child labour to child schooling.
- ⁴ See Thomas and Strauss (1992), Thomas et al. (1996) and Ray (1998a) for evidence on the impact of community infrastructure on child health.
- ⁵ I am grateful to Professor Kaushik Basu for suggesting this explanation to me.

References

- Anti-Slavery Society (1985) *Children in Especially Difficult Circumstances: Street Children*, Report for UNICEF (unpublished manuscript)

- Ashagrie K (1993) Statistics on Child Labor. *Bulletin of Labour Statistics* 3: ILO, Geneva
- Basu AM (1993) Family Size and Child Welfare in an Urban Slum: Some Disadvantages of Being Poor but Modern. In: Lloyd CB (ed) *Fertility, Family Size and Structure*, Population Council, New York
- Basu K (1998) Child Labor: Cause, Consequence and Cure, with Remarks on International Labor Standards. *Journal of Economic Literature* (forthcoming)
- Basu K, Van PH (1998) The Economics of Child Labor. *American Economic Review* 88(3):412–427
- Becker GS (1965) The Theory of Allocation of Time. *Economic Journal* 75:493–517
- Bhatty K (1998) Educational Deprivation in India: A Survey of Field Investigations. *Economic and Political Weekly* 33(27):1731–1740, 33(28):1858–1869
- Blanchard F (1983) *Report of the Director-General*, Geneva: ILO
- Bonnet M (1993) Child Labour in Africa. *International Labour Review* 132(3):371–389
- Boot HM (1995) How Skilled were Lancashire Cotton Factory Workers in 1833? *Economic History Reviews* 48(2):283–303
- Boudhiba A (1982) *Exploitation of Child Labor*. Final Report of the Special Rapporteur of the UN Sub-Commission on Prevention of Discrimination and Protection of Minorities. Geneva: UN
- Chernichovsky D (1985) Socioeconomic and Demographic Aspects of School Enrolment and Attendance in Rural Botswana. *Economic Development and Cultural Change* 32(1):319–332
- Fyfe A (1989) *Child Labor*. Polity Press, Cambridge
- Galbi DA (1997) Child Labor and the Division of Labor in the Early English Cotton Mills. *Journal of Population Economics* 10(4):357–376
- Grootaert C, Kanbur R (1995) Child Labour: An Economic Perspective, *International Labor Review* 134(2):187–203
- Grosh M, Glewwe P (1995) A Guide to Living Standards Measurement Surveys and their Data Sets. *LSMS Working Paper*, No. 120, World Bank, Washington, DC
- Horn P (1995) *Children's Work and Welfare. 1780–1890*, CUP, Cambridge
- ILO (1996) *Economically Active Populations: Estimates and Projections. 1950–2010*, International Labour Organisation, Geneva
- Jensen P, Nielsen HS (1997) Child Labour or School Attendance? Evidence from Zambia. *Journal of Population Economics* 10(4):407–424
- Knight WJ (1980) *The World's Exploited Children: Growing Up Sadly*. US Department of Labor, Bureau of International Labor Affairs, Monograph No. 4, Washington, DC
- McGregor P, Barooah VK (1992) Is Low Spending or Low Income a Better Indicator of Whether or Not a Household is Poor: Some Results from the 1985 Family Expenditure Survey. *Journal of Social Policy* 21(1):53–69
- Nardinelli C (1984) The Productivity of Corporal Punishment. *Explorations in Economic History* 21(2):224–228
- Patrinos HA, Psacharopoulos G (1997) Family Size, Schooling and Child Labour in Peru: An Empirical Analysis. *Journal of Population Economics* 10(4):387–406
- Psacharopoulos G (1997) Child Labor Versus Educational Attainment: Some Evidence from Latin America. *Journal of Population Economics* 10(4):377–386
- Ray R (1998a) *Child Health and its Determinants in Developing Countries: A Cross Country Comparison*. Discussion paper 1998-02, School of Economics, University of Tasmania, Australia
- Ray R (1998b) *Analysis of Child Labour in Peru and Pakistan: A Comparative Study*. Discussion Paper 1998-05, School of Economics, University of Tasmania, Australia
- Rosenzweig MR, Evenson R (1977) Fertility, Schooling and the Economic Contribution of Children in Rural India: An Econometric Analysis. *Econometrica* 45(5):1065–1079
- Slesnick D (1994) Consumption, Needs and Inequality. *International Economic Review* 35(3):677–703
- Thomas D, Strauss J (1992) Prices, Infrastructure, Household Characteristics and Child Height. *Journal of Development Economics* 39:301–331
- Thomas D, Lavy V, Strauss J (1996) Public Policy and Anthropometric Outcomes in the Cote d'Ivoire. *Journal of Public Economics* 61(2):155–192
- UNICEF (1991) *The State of the World's Children in 1991*. Oxford University Press, Oxford