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Growing concern about the incidence of child labour and attempts for its elimination at the national and international levels has been attracting attention of researchers. The complexities of the issue and the problems of inter-relatedness of factors affecting incidence of child labour are also being realised.[1] Policy formulation in India, in the rest of South Asia and elsewhere is still based on wisdom derived from micro studies[2], variables known to have correlation with the incidence of child labour and those which are presumed to drive demand and supply of child labour. Most of these variables are not only interdependent but have very different implications if the magnitudes or their interactions are different over time or across states as is happening in different states of India.

Examining the issue of the *Determinants of Child Labour* by bringing in these interdependent factors in a conventional economic model is very demanding in theoretical assumptions and data needs. Time series data for long enough periods are neither available nor very useful in view of structural breaks that occur in the process of economic growth. Dealing with cross section data either on a geographical basis (e.g. States) or disaggregated by sub-sectors brings in the complications of the variations due

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1 In the context of growing interest, see ILO (1998, 1997, 1997a, 1996), UNICEF (1997, 1996) and US Department of Labour (1994). The ILO has debated a Convention on Child Labour in mid-1998 and proposes to adopt it in 1999. The growing literature reviewed in Christian Grootaert & Ravi Kanbur (1995) is already dated. For recent additions in the specific context of India, see Burra (1995), Chaudhri (1996, 1997, 1997a and 1997b), Krishna (1996), Goonesekere (1998) and for a literature survey Jain (1995).

2 Literature on the so called Hazardous Industries has grown enormously in recent years mainly due to the efforts of the Ministry of Labour, Government of India, IPEC Programme of the ILO, UNICEF and the National Labour Institute. NGO's involvement in the subject is high and increasing.

to regions (states) or sub-sectors specificity. This paper is an attempt to combine the two (variations due to time and state specific factors) in a model and bring out the interdependence in a formal way.

The paper attempts to examine the phenomenon of child labour in India and is a preliminary search for the factors which affect demand and supply of child labour. The paper is divided into five sections. Section I deals with the incidence of child labour and its socio-economic correlates. In Section II, we present the results of factor analysis. Section III is devoted to model specification, and estimation procedures. Results are given in Section IV. The concluding section brings out the implications for policy and further research.

Section I: Socio-Economic Co-relates of Child Labour

We present information on SDP per capita, urbanisation, infrastructure, total fertility rates and educational variables for four Census points (1961 - 1991 pertaining to major states of India) in Table 1. A number of patterns are worth noting. SDP per capita at constant prices has grown very unevenly in different states of India with lowest growth in Bihar and highest in Punjab. Similar variations in proportion of urban population and relative index of infrastructure are also noticeable. Total fertility rate has declined in all states between 1961 and 1991. However, rate of decline has also been very uneven. Decline in total fertility rate in the states of Kerala and Tamil Nadu has been fastest while in UP and Bihar, it has been very slow.

Literacy rates (combined) have improved from 28 per cent to 52 per cent. Kerala is the only state with literacy rates of almost 90 per cent. All others have rates below 70 per cent. States with literacy rates below the national average are Bihar (38.5), Madhya Pradesh (44.2), Orissa (49.1), Rajasthan (38.6) and Uttar Pradesh (41.6). Gross primary school enrolment ratio every where have increased substantially with only Bihar and Uttar Pradesh reporting gross enrolment ratio of 73 and 75 per cent respectively. Variations in gross middle school enrolment ratios are much greater than those observed in literacy rates and/or primary school enrolment ratios. Here again, Bihar, Rajasthan and Uttar Pradesh have enrolment rates of less than 50 per cent and below the national

average. Per capita expenditure on education has much less variations across the states than other indicators of education including literacy rates.

We report a correlation matrix of child labour and associated socio-economic variables for four Census points in Table 2. The correlation matrix brings out a number of important patterns relevant for the choice of explanatory variables in our estimating regression equation. Components of child labour in terms of rural male, rural female, urban male and urban female child labour are correlated with each other suggesting that incidence of one is usual indicator of the incidence of the other.[3]

Children who are neither in schools nor in labour force, we call *Nowhere Children* also have a high correlation with the incidence of child labour. Rural male nowhere children, rural female nowhere children, urban male nowhere children and urban female nowhere children have a correlation of 0.81 to 0.88 with the incidence of rural male child labour. The inference that incidence of nowhere children and that of child labour are probably driven by the same set of factors acquires plausibility. Middle school education of male and female children has negative correlation with the incidence of child labour. Total fertility rates have negative correlation with primary school education of boys and girls as well as middle school education of boys and girls. Relative index of infrastructure has mildly negative correlation with rural child labour but not with urban child labour. It is negatively correlated with total fertility rate and female labour force participation rates also but the correlation coefficients are small.

Three generalisations from the observed patterns of the correlation matrix are important in our specifications of the estimated equations. Firstly, different components of child labour and those of nowhere children are highly correlated with each other and are driven by some other socio-economic variables. Therefore, we combine these into total child labour and use it as a dependent variable. Middle school male and female education. SDP per capita, relative index of infrastructure has negative correlation with the incidence of every component of child labour. Total fertility rates obviously contributes to total child population, thus contributing to the supply of child labour. Seen

[3] Issue has been examined in Chaudhri (1997a) as community effects.

in terms of demand and supply of child labour, we believe, that total fertility rate and the incidence of nowhere children adds to the pool of children from which child labour is drawn. As such, these, probably, augment the supply of child labour. School education of boys and girls up to middle school levels tends to reduce supply of child labour. Role of SDP per capita and relative index of infrastructure development is ambiguous because neither historical evidence nor contemporary views provide any reliable guide. However, we believe, both of them tend to reduce the incidence of child labour.

Section II: Search for Patterns: Factor Analysis

Arguments and evidence highlighting the role of community factor in important individual and household decisions that generate social outcomes like incidence of child labour, non-participation in school education and household's fertility decisions are presented in Chaudhri (1997). A large number of these micro decision factors are mutually reinforcing in positive or negative ways. Where the reinforcement is positive, we have called it *Virtuous Spiral*, and where it is negative, we have called it *Vicious Spiral*. To delineate such patterns at the state level, we attempt a factor analysis in which economic, demographic, educational and economic poverty variables have been included. The variables represent state level averages for the Census years 1981 and 1991. Data on population below the poverty line and a number of other variables for 1961 and 1971 was not available and we are aware of changes in the definition of workers between 1961 and 1971 Censuses. Therefore, we have restricted the factor analysis to 1981 and 1991.

Results of factor analysis with Principal Components method for rural India are reported in Table 3. For rural male child labour first factor explains 48.6 of variance while for rural female child labour the first factor explains 53.2 per cent of variance. First four factors explain over 85 per cent of variance for rural male child labour and 87.5 per cent of variance for rural female child labour. The factor loadings are in the expected direction. Variables with which first factor has a negative loading are per capita state domestic product (-9.62), gross enrolment ratio at primary level (-0.78), per child expenditure on elementary education (-0.78), female participation in labour force (-0.30) and enrolment of boys in middle schools (-0.87). The highest factor loading for rural

male child labour for boys enrolled in middle schools clearly brings out the important fact that children's participation in labour force is mainly concentrated in the age group 10-14.[4]

Three educational variables, namely, boys enrolment ratios at primary school level, per child expenditure in primary school education and boys enrolment ratios at middle school level, are not only mutually reinforcing but are driven by state's desire and ability to finance the educational efforts.

Total fertility rate has the highest positive factor loading with the incidence of male child labour (0.9). The factor loading with percentage of population below the poverty line is also positive (0.64) and with *Nowhere* rural boys (0.69). From the analysis of Factor 1, we found that six variables that are found negatively associated with the incidence of male child labour are per capita SDP, gross enrolment ratios at primary and secondary levels, per child primary school expenditure, females participation in labour force. Three variables which have a positive factor loading with the incidence of rural male child labour are total fertility rate, percentage of population below the poverty line and number of rural nowhere boys.

Seen from a policy perspective, two inferences are unmistakable - poverty, high total fertility rates and non-participation in school education are reinforcing. Policy makers need to address all the three by three separate but complimentary policy instruments. One such instrument is raising per child expenditure in primary and middle schools. Second important instrument is a major overhaul of primary and middle school facilities, and improving contents and delivery of quality education. This can be done by reducing opportunity cost of school attendance for children and improving supply side school facilities to increase retention rates in primary and middle schools. Factor loadings for rural female child labour is somewhat different from rural male child labour but has exactly the same pattern and similar signs and factor loadings.

Results of factor analysis, using Principal Component Method for urban male and female child labour, are presented in Table 3*. Variables which have negative factor

[4] See Chaudhri (1997) and NSS 50th Round results for evidence.

loadings with Factor 1 as was the case with rural male and female child labour, as per capita SDP, gross enrolment ratios at primary school levels, gross enrolment ratios at middle school levels, retention rates and per child expenditure on elementary education. Variables with positive factor loadings similar to those observed in rural child labour are percentage of population below the poverty line, total fertility rate and urban nowhere children. Explained variance for the first factor for urban male child labour is 45.6 and for urban female child labour is 51.2. Cumulative explained variances for first four factors are 83.5 per cent for boys and 85.1 per cent for girls. Inference for policy-makers is : *increase per child expenditure in school education and improve content, quality and efficiency of the supply of primary and middle school education services with particular focus on reducing rural urban and gender disparities.*

Section III: Model Specification and Method of Estimation

In this section we firstly model possible effects of these variables on the incidence of child labour. Given our time frame of four census decades and our focus on children, it is essential to allow for generational effects. It is also necessary to allow for different generations to coexist. We report here a simple adaptation of an overlapping generations model developed by Chaudhri and Wilson (1999) which characterises households receiving relatively low per capita income. We assume individuals live for three periods. However only two cohorts are considered here in that there are children and adults and no aged in the first period.

In the second period there are no children since they have grown up to adults whilst adults have become aged. We assume individuals maximise household welfare, which exclusively comprises utility from consumption over the two periods. There are no savings and adults send children to school in order to increase their human capital, which increases their future capacity to support household members in old aged.[5] In this model savings are therefore in the form of the accumulation of human capital, which has the

[5] This is consistent with our focus on low per capita families.

opportunity cost of present period consumption foregone by sending the child to school instead of work.

Total utility is the sum of the two period net present values given by:

$$U = u(c_1) + ru(c_2) \qquad u'(c_1) > 0, u''(c_1) < 0; u'(c_2) > 0, u''(c_2) < 0 \tag{1}$$

where c_1 and c_2 represent consumption in the first and second periods respectively. The discount rate is and the utility function is assumed to have the usual properties. Utility maximisation is subject to the budget constraints. Following Rammohan (1998), the first period constraint is:

$$c_1 = l_a w_a + l_c w_c - l_s s - f(l_c + l_s + l_n) \tag{2}$$

where l_a and l_c represent adult and child workers respectively, l_s is the number of children attending school and l_n is the number of nowhere children. The real returns for working adults and children are given by w_a and w_c respectively. The costs to the household are represented by real schooling costs, s, and costs of raising children, represented in functional form as $f(l_c + l_s + l_n)$. Clearly the decision about fertility will affect household utility. The second period budget constraint is:

$$c_2 = l_c w_a + l_s w_s - g(l_a + l_n) \tag{3}$$

where the previous period children are now adults. The prior child workers, l_c , now receive the adult real return, w_a , and those who have been to school, l_s , now receive the higher adult real return, w_s , reflecting their higher human capital. Note that this model can also include Lucas "learning by doing" by incorporating these returns in w_a . The costs to the family in this second period are given by $g(l_a + l_n)$, which represents the real functional costs of looking after the elderly, l_a , and the prior nowhere children, l_n , who

are assumed to be unemployed adults.[6] We assume that $f'(x)$, $f''(x)$, $g'(x)$ and $g''(x)$ exist and are non zero.The production functions for the two periods are:

$$y_1 = f_1(l_a, l_c) \quad \text{and} \quad y_2 = f_2(l_c, l_s) \tag{4}$$

respectively, which may exhibit decreasing, constant or increasing returns to scale.

Utility maximisation is given by the first order equation for child labour:[7]

$$u_c = u_{l_c} = \frac{\partial u}{\partial l_c} = u'(c_1)[w_c - f'(l_c)] + ru'(c_2)w_a = 0 \tag{5}$$

with second order condition, as shown by Chaudhri and Wilson (1999):

$$u_{cc} = \frac{\partial^2 u}{\partial l_c^{\,2}} = u'(c_1)[-f''(l_c)] + u''(c_1)[w_c - f'(l_c)]^2 + ru''(c_2)w_a^2 \tag{6}$$

Inspection of Equation (6) shows $u'(c_1)[-f''(l_c)] > 0$, $u''(c_1)[w_c - f'(l_c)]^2 \le 0$ and $ru''(c_2)w_a^2 < 0$. Utility maximisation requires $u_{cc}<0$, which holds when:

$$\left|u'(c_1)[-f''(l_c)]\right| < \left|u''(c_1)[w_c - f'(l_c)]^2 + ru''(c_2)w_a^2\right|$$

Let's now focus on the possible effects of changes in school attendance, l_s, adult employment, l_a and nowhere children, l_n, on child labour, l_c. Taking the total differential of Equation (5) gives:

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6 All variables are in real terms since there is no money and prices. A consequence of these assumptions are of course that there is no uncertainty. We also assume away the possibility of borrowing.

7 The term u_c is introduced for notational convenience.

$$u_{cc}dl_c + \frac{\partial^2 u}{\partial l_c \partial l_s}dl_s + \frac{\partial^2 u}{\partial l_c \partial l_a}dl_a + \frac{\partial^2 u}{\partial l_c \partial l_n}dl_n = 0$$

$$u_{cc}dl_c + u_{cs}dl_s + u_{ca}dl_a + u_{cn}dl_n = 0$$

with solution for child labour:

$$dl_c = -u_{cc}^{-1}\left[u_{cs}dl_s + u_{ca}dl_a + u_{cn}dl_n\right] \tag{7}$$

The partial derivatives are therefore:

$$\frac{dl_c}{dl_s} = \frac{-u_{cs}}{u_{cc}}, \qquad \frac{dl_c}{dl_a} = \frac{-u_{ca}}{u_{cc}} \quad \text{and} \quad \frac{dl_c}{dl_n} = \frac{-u_{cn}}{u_{cc}}$$

Since $u_{cc}<0$ the signs of the partial derivatives will be determined by the signs on u_{cs} , u_{ca} and u_{cn} . Chaudhri and Wilson (1999) show:

$$u_{cs} = u''(c_1)\left[-s - f'(l_s)\right]\left[w_c - f'(l_c)\right] + ru''(c_2)w_s w_a$$

so a negative relationship holds if $\left|u''(c_1)\left[-s - f'(l_s)\right]\left[w_c - f'(l_c)\right]\right| < \left|ru''(c_2)w_s w_a\right|$ and $\left[-s - f'(l_s)\right]\left[w_c - f'(l_c)\right] \geq 0$. Similar derivations are:

$$u_{ca} = u''(c_1)\left[w_c - f'(l_c)\right]w_a + ru''(c_2)w_a\left[-g'(l_a)\right]$$

$$u_{cn} = u''(c_1)\left[-f'(l_n)\right]\left[w_c - f'(l_c)\right] + ru''(c_2)\left[-g'(l_n)\right]w_a$$

which are also ambiguous in terms of sign. Accordingly it is difficult to simply assign the relative contributions of the interdependent effects of schooling, adult labour and nowhere children to the incidence of child labour.

If we expand the real return to adults, w_a and w_s , in the first and second periods to include productivity factors such as the provision of SDP per capita and the level of infrastructure, then this analysis also can include these types of influences on child labour. On the supply side note that this model explicitly incorporates supply side effects in the form of the number of children, $l_c + l_s + l_n$, which would be reflected in the fertility rate. The decisions to supply children to the labour market and to school in the first period are also included.

We therefore need to empirically estimate a form of Equation (7) in levels, in order to determine the possible effects of labour demand and supply factors on the incidence of child labour. We attempt two alternative model specifications.

Model 1: We postulate that;

Y: The magnitude of the incidence of total child labour in a state is a linear function of the causal variables:
$X_1, \ldots, X_5$, i.e. $Y_i = \beta_1 X_{1i} + \ldots + \beta_5 X_{7i} + u_i$. for i = 1, …, 15 states in any one of the census years, where:

X_1 = per capita state domestic product
X_2 = total fertility rate
X_3 = primary school enrolment ratio
X_4 = female participation rate in labour force.
X_5 = number of children neither in schools nor in labour force (Nowhere)

The error term (u_i) in the model is assumed to satisfy the classical assumptions of least squares, i.e., $u_1, \ldots, u_{15}$ have zero means, they have a constant variance and they are mutually uncorrelated.

The Model 1 may be estimated by OLS for each of the census years separately or ignoring changes due to time four cross-sections may be combined. The model specification takes the log linear form.

Model II : We postulate that:

$$\log Y_i = \alpha_1 \log X_{1i} + \ldots + \alpha_6 \log X_{6i} + V_I$$

where V_i's have zero mean, constant variance and zero intercorrelations. Again, for each individual census year estimation may be by OLS.

Pooling of Cross-Sections (States) and Time Series (Census Years) Data

We try, again, the two model specifications, viz.,

(a) linear form

(b) log linear form

on combined cross-sections and time series data. Model I is written as

$$Y_{it} = \beta_{1i} + \sum_{r=1}^{7} \beta_r X_{rit} + u_{it}$$

where i = 1, …, 15 (states), t = 1961, …, 1991 and there are 7 causal variables as stated above; and, correspondingly Model II may be expressed as

$$\log Y_{it} = \alpha_{1i} + \sum_{r=1}^{7} \alpha_r \log X_{rit} + v_{it}$$

It should be noted that the intercept term in both the models varies over states but not over census years. The Slope coefficients remain constant over time and over states.

The error terms satisfy the least squares assumptions as noted above. In the dummy variables formulation of the model, we assume that both the slopes and intercepts are non-random, although intercepts change over states (not over time) but slopes remain invariant over states/time.

OLS method provides estimates of the coefficients as shown in Table.

We also estimate the model by variance component method where the intercept terms β_{1i} and α_{1i} are random. We use the Kmenta pool method. The pooling technique described in Kmenta [1986, Section 17.2, pp. 616-625] employs a set of assumptions on the disturbance covariance matrix that gives a cross-sectionally heteroskedastic and time series auto-regressive model. The problem of under identification remains. Estimates of alternative specifications are given in Tables 4 and 5.

Section IV: Econometric Estimates of Alternative Specifications

As per specifications and estimation procedure discussed above, we estimate co-efficient of the determinants of child labour in major states of India using OLS and Kmenta's Pool methods. The results are reported in Table 4. The coefficients are well-estimated and are significant in both the estimation procedures used. Since we are using cross-section data with four time periods, for reasons discussed above, we consider Kmenta's Pool estimation procedure to be more efficient. The estimated coefficients based on OLS procedure are, in all cases, higher than those obtained by Kmenta's Pool method.

Per capita State Domestic Product tends to reduce the incidence of child labour has a co-efficient of -0.616 which is also significant at 1 per cent level. Since the estimating equation is in double logs, the estimated co-efficient is itself an elasticity. Total fertility rate with an elasticity of 0.383 significant at 1 per cent, as was expected, adds to the incidence of child labour. Children in primary schools, contrary to widely held beliefs, rather than reducing child labour seem to be increasing it with an estimated elasticity of 0.765. The coefficient is significant at one per cent level. For us this is not a surprising result. Because children in primary schools are mostly in the age group 6-11 years. Chaudhri (1997) based on analysis of the 50^{th} Round of Sample Survey Data for the year 1993-94 reported that 97.5 per cent of all child labour in India is in the age group 10-14 while only 2.5 per cent is in the age group 5-9. Since drop-out rates from primary to middle schools are extremely high in all states of India, including the best performer namely Kerala, the positive and significant co-efficient of children in primary schools is not surprising. Implications for educational policy, if its aim is to eliminate child labour,

are serious. Female labour force participation rate also adds to the incidence of child labour with a positive and significant elasticity of 0.385. This is probably because working females in India are mostly in agriculture or in low paid work. Presence of Nowhere Children, those who are neither in schools nor in labour force, adds to the incidence of child labour with a significant elasticity of 1.020 suggesting that a 10 per cent change in the incidence of Nowhere Children affects the incidence of child labour by virtually 10 per cent. Thus, among our explanatory variables per capita state domestic product is the only variable which has a dampening effect on the incidence of child labour. Total fertility rate and presence of Nowhere children are reinforcing factors which augment the supply of children from which child labour emerges.

As per reasoning present at above, we had decomposed the constant term into fifteen dummies each representing a state of India. Two interesting points are relevant in interpreting the decomposed constant term into state level dummies. The dummy for Andhra Pradesh has the lowest magnitude at -2.744. From Table 1, it can be seen that Andhra Pradesh has the highest incidence of child labour among all the States of India. Second, Kerala and Orissa have the largest magnitude of the dummy variable at -4.083 and -4.283 respectively. Kerala has the lowest incidence of child labour while the proportion in Orissa have been declining fast. The negative sign and significant co-efficient for the estimated dummies represent the state level observable and non-observable factors that impact on the incidence of child labour. Our interpretation of negative sign is that state level policies and efforts at the community level tend to dampen the high incidence of child labour represented by coefficients of explanatory variables discussed above.

In Table 5, we present the estimated coefficients of the determinants of child labour using the above specification with an addition of an explanatory variable representing number of children in middle schools. The equations using OLS estimation procedure and Kmenta's Pool method are well-estimated. We prefer estimated co-efficient based on Kmenta's Pool method. The coefficient for children in middle schools has a negative sign and is marginally significant while the signs of other estimated coefficients remain unchanged. The magnitudes do change substantially in some cases.

Contrasting estimated coefficients we report in Table 4 with those reported in Table 5 with two alternative specifications we find that the coefficients for per capita state domestic product at -0.6 remains stable. This confirms that level of per capita income has a dampening effect on child labour suggesting that economic growth should tend to dissolve child labour. Coefficients for total fertility rate remain significant but drops from 0.383 to 0.261. Coefficient for children in primary schools increases from 0.765 to 1.202. The coefficients for female labour force participation rate remain stable at around 0.36. The coefficient for nowhere children remains remarkably stable at 1.02 in both the specifications. Children in middle schools the additional explanatory variable reported in Table 5 with a coefficient of -0.240 as could have been expected tends to reduce child labour.

Overall, we find that per capita state domestic product and school education up to middle school level tends to reduce the incidence of child labour while total fertility rate, female participation in labour force, and incidence of nowhere children tend to increase child labour. Three of these variables that significantly affects child labour can be targetted through policy. Attempts at reducing total fertility rate would impact the level of child population which affects the incidence of child labour. Presence of Nowhere children suggests that the school system is unable to absorb the growing number of children which adds to the incidence of child labour. Since Nowhere children as an explanatory variable for the incidence of child labour has an elasticity of 1.02, we venture to suggest that bringing these children to school would reduce the incidence of child labour.

Decomposition of constant into 15 dummies was with a view to capture the state specific factors. Here again, Andhra Pradesh with highest incidence of child labour has the lowest estimated coefficient of the dummy variables. The negative signs of the dummy variables reflected declining trends in the incidence of child labour in all states of India since 1961 which have been presented in Table 1.

Variables influencing the incidence of child labour positively, in particular, incidence of Nowhere Children, Total Fertility Rate are directly associated with the incidence of poverty. In India, high female labour force participation rates are also associated with poverty. A number of studies in India have shown that female

participation rates in labour force follow an inverted U-shape pattern. As such, positive and high elasticity of female labour force participation rates with respect to the incidence of child labour also points in the direction of poverty. Per capita state domestic product reflecting level of economic development is the only explanatory variable in the Models that has a significant and negative coefficient with an elasticity of -0.6.

Section V: Conclusion and Policy Implications

We have attempted to track mainly the supply side factors that affect the incidence of child labour and found that these have a high association with the incidence of poverty. In our search for pattern we found that Factor I that explains almost half the variance is strongly associated with the incidence of poverty, female participation in labour force, Non-participation in the school system and the incidence of Nowhere Children. Their negative clustering has been called Vicious Spiral by us and the positive nature leading to reduction in the incidence of child labour, we have called Virtuous Spiral. From Table I and our Factor Analysis results, it is clear that the states of India are clearly divisible into two groups. Those which are part of the Virtuous Spiral and those which are still caught in the Vicious Spiral. States like Andhra Pradesh, Uttar Pradesh, Madhya Pradesh, Rajasthan and Bihar are in the Vicious Spiral while Kerala, Himachal Pradesh, Punjab, Tamil Nadu and Gujarat are in the Virtuous Spiral.

The major findings that would surprise policy-makers are positive and statistically significant elasticity of children in primary schools with respect to the incidence of child labour. To us, it is hardly surprising. Chaudhri (1997) while analysing the 50^{th} Round of National Sample Survey data has shown that 97.5 per cent of all child labour in India in 1993-94 was in the age group 10-14 years whereas the age-group attending primary schools normally considered of 6-11 years. That is the main reason why in our Model II when we included children in middle schools we found its coefficient to be a negative and significant at 5 per cent. The educational policy implications of our two alternative specifications clearly bring out the importance of schooling up to the age of 14 rather than only primary schools if the goal is to target the incidence of child labour.

Two inferences from our exercises are of relevance to the policy-makers and are inescapable. Firstly, the supply side factor of child labour are of crucial importance. All the determinants we considered are associated with the incidence of poverty. Therefore, dealing with poverty is the main instrument that can effectively eliminate child labour. Secondly, school education up to age of 14 can be a policy instrument to target child labour. Focusing of primary schools alone will obviously have enormous other social benefits and may influence factors like total fertility rate but are unlikely to be effective in dealing with the problem of child labour in view of the fact that incidence of child labour is in the age group of 10-14. The subject needs considerable detailed research and policy-analysis.

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TABLE 1 : SOCIO-ECONOMIC CHARACTERISTICS OF MAJOR STATES OF INDIA 1961-1991

	SDP PER CAPITA Constant Price (70-71 prices) (Rs)				PROPORTION OF URBAN POPULATION				RELATIVE INDEX OF INFRASTRUCTURE				TOTAL FERTILITY RATES (15-49 years)			
	1961	1971	1981	1991	1961	1971	1981	1991	1961	1971	1981	1991	1961	1971	1981	1991
Andhra Pradesh	530	585	647	975	17.4	19.3	23.3	26.9	93	91	98	98	4.6	4.6	4.0	2.8
Bihar	389	402	441	626	8.4	10.0	12.5	13.1	98	106	97	97	7.9	5.6	5.7	4.6
Gujarat	687	829	904	1358	25.8	28.1	31.1	34.5	111	122	125	124	7.1	5.6	4.3	3.2
Haryana	650	877	1060	1677	47.2	17.7	21.9	24.6	129	148	154	156	8.9	6.7	5.0	3.8
Himachal Pradesh	48	651	711	1050	6.3	7.6	8.7	24.6	na	64	79	86	6.7	5.2	3.8	3.1
Karnataka	526	641	687	1045	22.3	24.3	28.9	30.9	90	101	101	93	5.3	4.4	3.6	2.9
Kerala	509	594	621	1103	15.1	16.2	18.8	26.4	135	202	137	138	5.6	4.1	2.8	1.7
Madhya Pradesh	508	484	516	862	14.3	16.3	20.3	23.2	53	60	62	72	5.6	5.6	5.2	4.4
Maharashtra	745	783	957	1775	28.2	31.2	35.0	38.7	117	115	118	111	5.9	4.6	3.6	2.9
Orissa	236	478	477	789	6.3	8.4	11.8	13.4	69	75	82	86	4.3	4.7	4.3	3.1
Punjab	790	1070	1354	1794	23.1	23.7	27.7	29.6	201	206	215	211	6.7	5.2	4.0	3.1
Rajasthan	519	651	535	906	16.3	17.6	20.9	22.9	59	70	77	85	6.6	6.2	5.2	4.5
Tamil Nadu	558	581	584	983	26.7	30.3	33.0	34.2	171	173	153	139	3.7	3.9	3.4	2.2
Uttar Pradesh	453	486	519	750	12.9	14.0	18.0	19.8	107	116	107	111	7.6	6.6	5.8	5.2
West Bengal	737	722	797	1030	24.5	26.7	26.5	27.5	152	142	132	115	6.8	5.4	4.2	2.9
ALL-INDIA	561	638	699		18.0	19.9	23.3	26.1	100	100	100	100	5.6	5.2	4.5	3.6

	LITERACY RATES (combined)				GROSS PRIMARY SCHOOL ENROLMENT RATIO				GROSS MIDDLE SCHOOL ENROLMENT RATIO				PER CAPITA EXPEN. ON EDUCATION CURR.PRICES (RS.)		
	1961	1971	1981	1991	1961	1971	1981	1991	1961	1971	1981	1991	1970-71	1980-81	1991-92
Andhra Pradesh	25.0	29.0	35.7	44.1	68.3	70.3	76.7	93.2	16.8	23.6	27.9	49.2	14.3	43.1	179.1
Bihar	22.0	33.0	32.0	38.5	50.7	53.5	74.1	73.1	17.1	20.1	21.2	32.9	8.6	33.8	149.7
Gujarat	36.0	42.0	52.2	61.3	72.1	84.6	96.5	105.7	26.3	36.1	45.9	67.7	15.9	53.1	256.0
Haryana	20.3	32.0	43.9	55.9	na	70.7	71.4	83.8	na	40.3	45.6	68.6	18.5	56.5	236.9
Himachal Pradesh	20.0	37.0	51.2	63.9	na	92.7	101.5	110.1	na	50.9	57.5	100.0	11.4	105.1	458.5
Karnataka	30.0	37.0	46.2	56.0	73.8	84.3	91.3	119.2	22.4	32.1	38.3	67.0	18.4	46.6	218.8
Kerala	55.0	70.0	81.6	89.8	108.2	117.3	101.2	96.1	58.3	69.8	91.4	100.5	28.1	85.3	282.3
Madhya Pradesh	21.0	26.0	34.2	44.2	49.2	79.1	61.4	98.0	15.5	25.8	29.7	55.0	11.9	33.0	160.5
Maharashtra	35.0	46.0	55.8	64.9	77.3	89.7	105.7	118.8	27.8	36.1	44.8	81.6	19.5	60.8	270.5
Orissa	25.0	31.0	41.0	49.1	63.7	74.5	81.1	100.6	9.0	21.9	27.4	50.0	11.0	41.0	183.6
Punjab	29.0	39.0	48.1	58.5	50.8	89.3	108.8	84.6	29.4	47.1	59.6	65.6	22.2	82.8	328.9
Rajasthan	18.0	23.0	30.1	38.6	40.9	57.1	58.5	85.1	14.5	26.2	27.3	46.2	16.1	42.6	213.6
Tamil Nadu	36.0	45.0	54.4	54.6	85.5	104.1	109.9	143.5	31.6	47.9	51.5	103.4	17.6	50.0	241.5
Uttar Pradesh	21.0	25.0	33.3	41.6	44.7	77.8	71.6	75.7	16.6	30.8	28.5	46.6	8.5	31.7	149.6
West Bengal	35.0	39.0	48.6	57.7	64.9	83.9	80.6	104.2	21.7	30.6	30.5	53.1	15.7	45.3	203.4
ALL-INDIA	28.0	34.0	43.7	52.1	93.4	na	na	91.7	43.5	33.2	42.4	48.0	14.5	46.1	207.9

Sources: CMIE, Basic Statistics Relating to the Indian Economy, Vol 2.,States- Sept 84, Sept 93, Sept 94 and Various Issues.
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Notes: 1.Per Capita Net State Domestic Product at constant 1970-71 prices.
2.In the absence of 1991 data, 1981 proportions have been assumed except Punjab and Haryana
3. Fertility rate in 1991 refer to the year 1992.
4. Literacy rate in 1991 excludes 0-7 yrs age group.
5.Figures of Enrolment Ratio corresponds to the 71(Third) ,81 (Fourth), 91(Sixth) Educational Surveys.

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Table 2: Co-relation Matrix of Child Labour and Associated Explanatory Variables: India 1961 - 1991

	RMCL	RFCL	UMCL	UFCL	PSDP	RII	TFR	MPE	FPE	FLPR	RMNC	RFNC	UMNC	UFNC	MME	FME
RMCL	1.00															
RFCL	0.77	1.00														
UMCL	0.86	0.62	1.00													
UFCL	0.71	0.69	0.87	1.00												
PSDP	-0.23	-0.27	-0.02	0.13	1.00											
RII	-0.18	-0.41	0.19	0.06	0.29	1.00										
TFR	0.23	0.15	-0.07	-0.29	-0.60	-0.19	1.00									
MPE	-0.10	0.08	0.10	0.36	0.35	0.02	-0.71	1.00								
FPE	-0.29	-0.16	0.05	0.24	0.55	0.33	-0.79	0.85	1.00							
FLPR	0.12	0.60	0.02	0.36	-0.09	-0.53	-0.21	0.37	0.10	1.00						
RMNC	0.88	0.53	0.74	0.52	-0.18	-0.07	0.24	-0.13	-0.26	-0.09	1.00					
RFNC	0.88	0.63	0.80	0.62	-0.23	-0.09	0.26	-0.11	-0.26	-0.07	0.89	1.00				
UMNC	0.81	0.54	0.95	0.78	0.08	0.21	0.01	0.01	-0.01	-0.09	0.99	0.89	1.00			
UFNC	0.81	0.55	0.95	0.79	0.19	0.25	0.10	0.25	-0.01	-0.07	0.76	0.81	0.96	1.00		
MME	-0.53	-0.33	-0.21	-0.10	0.66	0.32	-0.64	0.62	0.78	0.00	-0.42	0.45	-0.19	-0.22	1.00	
FME	-0.41	-0.32	-0.03	0.08	0.66	0.43	-0.73	0.67	0.89	-0.08	-0.30	-0.32	-0.02	0.04	0.93	1.00

Note: 1. All Variables appear in log form.
2. Description of variables.

RMCL Log (Rural Male Child Labour)
RFCL Log (Rural Female Child Labour)
UMCL Log (Urban Male Child Labour)
UFCL Log (Urban Female Child Labour)
PSDP Log (Per capita State Domestic Product)
RII Log (Relative Index of Infrastructure)
TFR Log (Total Fertility Rate)
MPE Log (Male Primary Education)
FPE Log (Female Primary Education)
FLPR Log (Female Labour Participation Rate)
RMNC Log (Rural Male Nowhere Children)
RFNC Log (Rural Female Nowhere Children)
UMNC Log (Urban Male Nowhere Children)
UFNC Log (Urban Female Nowhere Children)
MME Log (Male Middle Education)
FME Log (Female Middle Education)

Table 3: Factor Analysis Results With Principal Components Method for Male and Female Child Labour in Rural India 1981-1991

Variables	Male Child Labour				Female Child Labour			
	Factor 1 Loading	Factor 2 Loading	Factor 3 Loading	Factor 4 Loading	Factor 1 Loading	Factor 2 Loading	Factor 3 Loading	Factor 4 Loading
Per capita State Domestic Product	-0.62	-0.41	0.31	-0.29	-0.63	-0.47	-0.23	0.38
Percentage of Population below poverty lir	0.64	0.55	-0.27	0.31	0.63	-0.52	-0.13	0.32
Total Fertility Rates	0.90	-0.09	0.02	-0.27	0.92	-0.16	-0.05	-0.14
Gross Enrolment Rates at Primary Level	-0.78	-0.11	-0.33	0.37	-0.84	0.07	0.32	0.27
Boys in primary schools: Enrolment Ratio	-0.56	0.70	-0.14	-0.01	---	---	---	---
Girls in primary schools: Enrolment Ratio	---	---	---	---	-0.83	-0.42	-0.06	-0.05
Per child educational expenditure (primary	-0.78	0.08	-0.45	-0.28	-0.66	-0.19	-0.59	0.27
Female labour participation rate	-0.30	0.81	-0.04	-0.03	-0.25	0.82	-0.23	-0.28
Rural Nowhere boys	0.69	-0.06	-0.63	0.09	---	---	---	---
Rural Nowhere girls	---	---	---	---	0.72	-0.13	-0.54	0.21
Boys in Middle schools: Enrolment Ratio	-0.87	0.15	-0.03	-0.20	---	---	---	---
Girls in Middle Schools: Enrolment Ratio	---	---	---	---	-0.91	0.08	-0.03	0.05
Enrolments in Class V as p.c. of Class I e	-0.57	-0.36	-0.34	0.57	-0.61	-0.29	-0.26	0.57
Variance Explained (%)	48.60	18.30	10.30	8.70	53.20	15.40	10.50	8.20
			Cummulativ	= 85.40			Cummulativ	+ 87.50
Eigen value	4.80	1.80	1.03	0.80	5.30	1.50	1.05	0.80

Table 3*: Factor Analysis Results With Principal Components Method for Male and Female Child Labour in Urban India 1981-1991

Variables	Male Child Labour				Female Child Labour			
	Factor 1 Loading	Factor 2 Loading	Factor 3 Loading	Factor 4 Loading	Factor 1 Loading	Factor 2 Loading	Factor 3 Loading	Factor 4 Loading
Per capita State Domestic Product	-0.63	-0.37	0.46	-0.23	-0.63	-0.38	-0.47	0.23
Percentage of Population below poverty lir	0.69	0.56	0.17	0.33	0.62	0.58	-0.17	-0.26
Total Fertility Rates	0.90	0.56	0.17	0.33	0.92	-0.18	-0.90	0.11
Gross Enrolment Rates at Primary Level	-0.77	-0.11	-0.23	0.37	-0.83	0.03	0.22	-0.36
Boys in primary schools: Enrolment Ratio	-0.55	0.72	0.08	-0.90	---	---	---	---
Girls in primary schools: Enrolment Ratio	---	---	---	---	-0.82	0.45	-0.03	-0.08
Per child educational expenditure (primary	-0.81	0.09	-0.07	-0.09	-0.75	0.02	-0.32	0.41
Female labour participation rate	-0.28	0.81	-0.07	-0.09	-0.24	0.84	0.02	0.33
Urban Nowhere Boys	0.39	0.11	0.82	0.16	---	---	---	---
Urban Nowhere Girls	---	---	---	---	0.95	0.19	-0.76	-0.24
Boys in Middle schools: Enrolment Ratio	-0.87	0.17	-0.07	-0.22	---	---	---	---
Girls in Middle Schools: Enrolment Ratio	---	---	---	---	-0.91	0.09	0.02	-0.04
Enrolments in Class V as p.c. of Class I e	-0.60	-0.32	-0.16	0.56	-0.69	-0.23	-0.17	-0.45
Variance Explained (%)	45.60	18.30	11.00	8.60	51.20	15.30	10.30	8.30
			Cummulativ =	83.50			Cumulative =	85.10
Eigen value	4.50	1.80	1.10	0.80	5.10	1.50	1.03	0.80

Notes: (a) Data sources: Chaudhri, D.P. (1996): A Dynamic Profile of Child Labour inIndia: 1951-91, ILO, New Delhi, Census of India, 1961, 1971, 1981 & 1991 and INDIA: UNIFPA, Towards Population and Development Goals, Oxford University Press, 1997

(b) Data consists of state level observations for fifteen major states for the years 1981 & 1991 (N = 30).

Table 4: Estimated Co-efficients of the Determinants of Child Labour in Major States of India 1961 - 1991

Dependent variable: log Y = log (estimates of Child Workers)

Estimating equation: $\log Y = \beta_1 \log X_1 + \beta_2 \log X_2 + \beta_3 \log X_3 + \beta_4 \log X_5 + \beta_8 \log X_8 + \beta_I$ (dummy for each state)

N = 240

Explanatory Variable	Name	Child Labour OLS Estimates		Child Labour Kemanta's Pool	
		Co-efficient	t-values	Co-efficient	t-values
X_1	Per capita State Domestic Product	-1.079**	-2.9	-0.616**	-5.4
X_2	Total Fertility Rate	0.603*	1.6	0.383**	3.6
X_3	Children in primary schools	1.637**	9.3	0.765**	6.9
X_4	Female labour Participation Rate	0.595**	4.8	0.385**	10.4
X_5	Nowhere Children	1.207**	24.0	1.020**	31.7
D_1	Andhra Pradesh	-7.457**	-2.4	-2.744**	-2.7
D_2	Bihar	-8.424**	-2.7	-3.902**	-4.0
D_3	Gujarat	-7.904**	-2.4	-3.534**	-3.4
D_4	Haryana	-7.140**	-2.2	-3.429**	-3.2
D_5	Himachal Pradesh	-7.409**	-2.4	-3.707**	-3.8
D_6	Karnataka	-7.655**	-2.5	-3.114**	-3.1
D_7	Kerala	-8.227**	-2.8	-4.083**	-4.2
D_8	Madhya Pradesh	-7.981**	-2.6	-3.613**	-3.5
D_9	Maharashtra	-7.852**	-2.4	-3.233**	-3.1
D_{10}	Orissa	-8.175**	-2.8	-4.213**	-4.5
D_{11}	Punjab	-6.728**	-2.1	-3.091**	-2.7
D_{12}	Rajasthan	-7.589**	-2.4	-3.069**	-3.0
D_{13}	Tamil Nadu	-7.736**	-2.6	-3.013**	-3.1
D_{14}	Uttar Pradesh	-8.189**	-2.6	-3.645**	-3.6
D_{15}	West Bengal	-8.086**	-2.6	-3.947**	-3.7
		$\bar{R}^2$ 0.82	DF = 219	Buse $\bar{R}^2$ 0.92	DF = 219

Notes: (a) Data sources: Chaudhri, D.P. (1996): *A Dynamic Profile of Child Labour in India: 1951-91*, ILO New Delhi and Census of India, 1961, 1971, 1981 and 1991 and Chaudhri (1997).

(b) Estimating procedure: OLS and Kemanta's Pooling regression Methods. We have 5 explanatory variables and data for 15 States of India for four points of time for rural and urban male and female child labour. We generate 15 dummy variables for 15 states, for example D_1 for Andhra Pradesh takes a value of 1 for four AP observations and zero for all others.

(c) *t - ratio significant at 5% and ** t-ratio significant at 1%.

(d) Constant term has been decomposed into fifteen state Dummies. See text for details.

(e) Explanatory Variables

X_1 = Per Capita State Domestic Product at 1970-71 Constant Prices

X_2 = Total Fertility Rate

X_3 = No. of Children in Primary Schools

X_4 = Female Labour Participation Rates.

X_5 = No. of Nowhere Children (who are neither in schools nor in Labour Force).

Table 5: Estimated Co-efficients of the Determinants of Child Labour in Major States of India 1961 - 1991

Dependent variable: log Y = log (estimates of Child Workers)

Estimating equation: $\log Y = \beta_1 \log X_1 + \beta_2 \log X_2 + \beta_3 \log X_3 + \beta \log X_4 + \beta_5 \log X_5 + \beta_I + \beta_6 \log X_6 + \beta_I$ (dummy for each state)

N = 240

Explanatory Variable	Name	Child Labour OLS Estimates		Child Labour Kemanta's Pool	
		Co-efficient	t-values	Co-efficient	t-values
X_1	Per capita State Domestic Product	-1.215**	-3.0	-0.622**	-5.2
X_2	Total Fertility Rate	0.599*	1.5	0.261*	1.9
X_3	Children in primary schools	1.211**	2.2	1.202**	4.4
X_4	Female labour Participation Rate	0.620**	4.8	0.363**	8.6
X_5	Nowhere Children	1.206**	23.9	1.023**	32.3
X_6	Childrenn in Middle Schools	0.269	0.8	-0.240*	-1.5
D_1	Andhra Pradesh	-5.696**	-1.5	-3.540**	-3.2
D_2	Bihar	-6.735**	-1.8	-4.688**	-4.3
D_3	Gujarat	-6.153**	-1.6	-4.326**	-3.8
D_4	Haryana	-5.486**	-1.4	-4.064**	-3.6
D_5	Himachal Pradesh	-5.778**	-1.5	-4.441**	-4.2
D_6	Karnataka	-5.897**	-1.6	-3.988**	-3.6
D_7	Kerala	-6.613**	-1.8	-4.817**	-4.5
D_8	Madhya Pradesh	-6.313**	-1.7	-4.348**	-3.9
D_9	Maharashtra	-6.097**	-1.6	-4.036**	-3.5
D_{10}	Orissa	-6.373**	-1.7	-5.040**	-4.6
D_{11}	Punjab	-5.028**	-1.3	-3.748**	-3.2
D_{12}	Rajasthan	-5.905**	-1.6	-3.817**	-3.4
D_{13}	Tamil Nadu	-6.025**	-1.6	-3.880**	-3.6
D_{14}	Uttar Pradesh	-6.555**	-1.8	-4.364**	-4.0
D_{15}	West Bengal	-6.293**	-1.6	-4.814**	-4.1
		$\bar{R}^2$ 0.82	DF = 218	Buse $\bar{R}^2$ 0.92	DF = 218

Notes: (a) Data sources: Chaudhri, D.P. (1996): *A Dynamic Profile of Child Labour in India: 1951-91*, ILO New Delhi and Census of India, 1961, 1971, 1981 and 1991 and Chaudhri (1997).

(b) Estimating procedure: OLS and Kemanta's Pooling regression Methods. We have 5 explanatory variables and data for 15 States of India for four points of time for rural and urban male and female child labour. We generate 15 dummy variables for 15 states, for example D_1 for Andhra Pradesh takes a value of 1 for four AP observations and zero for all others.

(c) *t - ratio significant at 5% and ** t-ratio significant at 1%.

(f) Constant term has been decomposed into fifteen state Dummies. See text for details.

(g) Explanatory Variables

X_1 = Per Capita State Domestic Product at 1970-71 Constant Prices

X_2 = Total Fertility Rate

X_3 = No. of Children in Primary Schools

X_4 = Female Labour Participation Rates.

X_5 = No. of Nowhere Children (who are neither in schools nor in Labour Force).

X_6 = No. of Children in Middle Schools