Working Paper No. 116

Labour force participation of children in rural India: An analysis of the Determinants

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November 1993

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1. Introduction

In India, according to Population Census 1981, around 11 million children in the age group 5-14 were in the labour force as main workers and a little over 2 million children participated in the labour market as marginal workers. The National Sample Survey (38th round on Employment and Unemployment) estimates that in 1983 more than 15 million children in the age group 5-14 were workers by their principal status, and approximately another 5 million were workers by their secondary status. The distribution of child labourers by their residence, provided in Table 1, indicates that irrespective of the source of data, more than 88 per cent of them were in rural India. In this connection, it needs to be pointed out that child labour in particular industries and in particular locations, by virtue of either spatial or industrial concentration, has tended to attract the somewhat exclusive attention of both researchers and policy-makers. Consequently, there has been very little attempt at identifying the determinants of labour force participation of children in general, and in particular for rural India. This paper represents an effort at bridging this gap.

In an agrarian economy, such as India, massive under-employment and unemployment of labour on the one hand and on the other long hours of work and very high labour market participation of children characterise the functioning of the labour market. Wage rates or daily earnings, particularly real earnings, are often so low that they hardly cover individual subsistence. In a situation such as this, children are forced to enter the labour market to augment the meagre income of the poor households to which they belong. Thus labour market entry of children is conceived of as an

economic necessity of poor families and is viewed as an inescapable response to economic forces. The labour market entry of children merits special attention, as labour force participation of children leads to (a) employment of children in static, unskilled low productivity and low paid occupations; and (b) erosion of labour market regulations relating to minimum wages, hours of work and working conditions. Labour market regulations are easily evaded since, apart from the fact that child labour is not organised, it is often the case that the child labour and the families that supply them , for fear of starvation, conceal the employment of children. Enforcement of the various labour market regulations too becomes difficult for a number of reasons:the magnitude of the problem is vast and the forces that interact are numerous and complex; as indicated earlier, child labourers and their families conceal employment, which makes enumeration difficult; child labourers are spatially well dispersed, particularly in rural India.

Child labour, though viewed as a "normal" response to economic forces which may contribute significantly to the family economy, deprives the children of school attendance and leads to life-time disadvantages in the labour market as a result of low skill accumulation and consequent low upward mobility in the occupational structure. Poverty and the consequent struggle for subsistence, thus induces "deprivation" of human capital accumulation which leads to (a) a vicious circle through which child labour is perpetuated, and (b) sustains the circulation of poor human capital that impairs the long run growth of the economy. It is therefore a matter of some importance that an attempt be made at identifying the determinants of labour force participation of children in rural India, so that this might enable us to suggest meaningful policy measures directed at eradicating this social evil. This is the underlying motivation of the present paper.

To this end the paper, begins by providing the incidence of child labour in rural India estimated based on the Census, 1981 and the NSS, 1983 data (Section 2). Consistency of the Census, 1981 data vis-a-vis the NSS, 1983 data to capture spatial variability in the incidence of child labour is, also, evaluated. Section 3, provides the framework for analysis and postulates supply of child labour as a function of economic and non-economic variables. Section 4, provides the estimating equation and specification of a number of variables which conform to the ingredients of the framework of analysis. The results are furnished and discussed in section 5. Concluding observations are offered in section 6.

2 The Incidence of Child Labour in Rural India: Some Preliminary Order of Magnitude

In this paper, I shall treat the labour force participation of children - data on which are available - as a proxy for the supply of child labour. The labour force participation rate (denoted henceforth as LFPR) of children is defined as the percentage of workers, in the age group 5-14, in total population in this age group. The two principal sources of data we shall employ are the population Census 1981, and the National Sample Survey (38th round on Employment and Unemployment). Census employs the categories of 'main' and 'marginal' workers, which the NSS employs the categories of 'principal status' and 'subsidiary status' workers. For the major states[1] of rural India, Table 2 presents NSS data on labour force participation rates of children for each of the cases where the category of 'subsidiary status' workers is excluded and included from the definition of 'workers'. Similarly, Table 3 presents census rates of labour force participation of children, for each of the cases where the category of 'marginal' workers is excluded and included from the definition of 'workers'.

A quick glance at Tables 2 and 3 reveals, irrespective of the source of data, that there exists large inter-state variability in the estimated LFPRs of children. LFPRs derived, excluding marginal (subsidiary status) workers from the census (respectively, NSS) data for males vary from 1.14 per cent in Kerala (1.85 per cent in Kerala) to 16.66 per cent in Andhrapradesh (23.16 per cent in Andhrapradesh). Similarly, for females, the corresponding figures vary from 1.11 per cent in Kerala (1.21 per cent in Kerala) to 12.92 per cent in Andhrapradesh (20.21 per cent in Rajasthan). The co-efficients of variation for LFPRs estimated (provided in the last row of each column of Tables 2 and 3) are above 38 per cent which too confirm, irrespective of the source of data, the existence of large inter-state variability in LFPRs of children. The co-efficients of variation for LFPRs estimated, using census data, across districts, respectively including and excluding 'marginal' workers for males are high at 42.92 and 72.89 per cent. Corresponding figures for females are, also, high at 43.79 and 87.01 per cent. These results confirm the existence of large inter-state and inter-district variability in labour force participation of children.

At this juncture, it should be pointed out that though the NSS data capture LFPRs of children better, for the major part of the analysis we rely on census data. Census data are preferred to the NSS data as the latter do not furnish information disaggregated below the level of the state. Accordingly, we rely on census data to analyse the inter-district variability in LFPRs of children and the causes thereof. This calls for assessing the consistency of census data to capture the variability in LFPRs of children across space at a single point of time. Correlation co-efficients are estimated between independent rankings of the states based on LFPRs derived using the two sources of data: census and NSS, respectively, (a) excluding 'marginal' and 'subsidiary' status

workers and (b) including 'marginal' and 'subsidiary' status workers. They are: 0.91 and 0.79 for males; and 0.88 and 0.87 for females, which are significant at 5 per cent level. This result does not confirm rank reversal across states between the two sources of data, which suggests that while there may be under-estimation of LFPRs of children by the census, the under-estimation across space is consistent and does not alter the spatial pattern that obtains using the NSS data. Thus, census data could well be used[2] to analyse the variability in LFPRs of children across space at a single point of time.

3. Framework for Analysis

Poverty and the consequent struggle for survival[3], as indicated earlier, are the major determinants of supply of child labour. In this connection, postulating supply of labour, particularly supply of child labour, to depend on income captures the impact of survival - threatening deprivation on the supply of child labour. The importance of income for survival in determining supply of labour was stressed by Dobb (1928). To quote Dobb, "If [a person] was starving a £ would mean so much to him that he would do almost anything that was within his physical powers in order to earn it. To a man who had a plot of land or some savings on the other hand, a £ would mean very much less ...". In short the poorer the labourer and greater his need for wage income, given wage rate, higher will be the supply of labour. This suggest that the supply of labour is, in general, a function of non-labour income. The essence of this argument can be brought out, more clearly, with the help of a simple diagram. Figure 1 depicts such a relationship between income and supply of labour. Wage rate is measured on the 'vertical' axis and supply of labour on the 'horizontal' axis. Curves S1,S2,S3, and S4 are labour supply curves of individuals with different levels of non-labour income. Given the market wage

rate to be w, 0s1,0s2,0s3, and 0s4 are the quantities of labour that would be supplied by the different individuals. It is clear that as we move from individual with the lowest income (ie from individual whose labour supply curve is S1) to individuals with higher and higher income (ie to individuals whose labour supply curves are to the left of S1) the quantity of labour that would be supplied becomes smaller and smaller. Thus, supply of labour is a declining function of non-labour income.

Supply decisions on child labour are, to a great extent, made by the households or parents of children, which depends on how acutely the households need to sell the labour power of their children to ensure survival. Thus the supply of child labour depends on the income of the household, which consists of the non-labour income (call this NLI) and the labour income of adult wage earners in the household (call this WIA). As might be expected, supply of child labour varies inversely with NLI and WIA of households.

Writing SCL for the supply of child labour, the relevant functional relation could be written as follows:

$$SCL = f(NLI, WIA) \qquad \ldots(1).$$

While the non-labour and wage income of adults of households are not directly observable, one could identify the factors related to NLI and WIA. This leads to postulation of a pair of equations of the following type:

$$NLI = h_1(Q_l, Y_l, IOTHASS); \text{ and} \qquad \ldots(2)$$

$$WIA = h_2(W_a, N_e) \qquad \ldots(3).$$

Given equations (1) - (3), the reduced form of the labour supply function for children could be written as :

$$SCL = g(Q_l, Y_l, IOTHASS, W_a, N_e) \quad ...(4)$$

where Q_l is the quantity of land owned by the household, Y_l is the yield rate of land, IOTHASS, is income from other assets owned, W_a is the market wage rate for adults and N_e is the number of days employment available for adult wage earners in the household.

The reduced form of the labour supply function, as captured in (4), can be rendered more complete by a consideration of factors relating to risk and uncertainty in earnings, particularly in wage earnings. At low levels of income, when a household has to meet a continuous stream of consumption expenditure, any fluctuation - however small - in the flow of income will have a considerable impact on survival of the household's members. Thus instability in earnings may be expected to elicit the supply of child labour as a means of insurance against unpredictably adverse states of nature.

In a society such as India's, which is characterised by cultural diversity and discrimination based on a well defined caste system, sociological[4] factors - in addition to purely economic ones - may be expected to have considerable bearing on economic outcomes. Equally important are education - related factors, such as social attitudes towards learning, access to formal education facilities and the like; denoting them, respectively, by the variables Instability, Social, and Education, one can write the labour supply function of children as follows:

$$SCL = (Q_l, Y_l, IOTHASS, W_a, N_e, Instability, Social, Education) \quad ...(5).$$

Given the reduced form of supply function of child labour, it should be pointed out that data at the desired level of disaggregation - disaggregated to the level of households - are not available. As a result, the analysis is restricted to the level of district, the finest level of disaggregation that could be

employed dictated by the availability of data. Thus, given the framework for analysis, in the next section, an estimating equation is provided.

4. An Estimating Equation

Most of the variables included in equation 5 are not directly observable. Hence, in accordance with the normal practice in empirical research, we resort to suitable proxies. Value of agricultural output (in Rs 1000) per head of cultivator, Gini ratio of land concentration, Ratio of agricultural labourers to cultivators and Percentage of households who do not own land cultivated are chosen as proxies to represent NLI of the households. Value of agricultural output per head of agricultural labour is employed as a proxy for wage rate of adults (W_a). Gross cropped area per head of rural population, Tractors available per 1000 hectare of gross cropped area and Fertilizer used (in kgs) per hectare of gross cropped area are proxies related to number of days employment available for adult wage earners (N_e) in the household. To represent risk and uncertainty in earnings of the household members (Instability), Percentage of gross cropped area irrigated is selected. Education and Social variables are represented respectively by Percentage of children attending school, in the age group 5-14, to total population in the same age group and Percentage of Schedule caste and tribe population in the total population of the district. These variables and the rationale for selection and expected signs of the co-efficients are discussed in greater detail below.

Value of Agricultural Output Per Head of Cultivator (VOUTPC): This variable is used as a proxy for the level of non-labour income of households. VOUTPC, is only a partial measure of NLI of households: income from other assets of households is not captured in this variable. Nevertheless, this seems to be a good proxy as

land owned and other assets possessed by households are expected to be linearly related. This variable, for reasons enumerated earlier, is expected to bear a negative relationship with LFPRs of children.

Gini Ratio of Land Concentration (LGINI): This variable is introduced as a proxy for distribution of income from land among households cultivating land. Given the level of income from land, distribution determines the income of households. To be more precise, for any given level of income, greater concentration implies that larger proportion of households have lower income. Thus , LGINI is expected to be positively related to supply of child labour.

Ratio of Agricultural Labourers to Cultivators (RAGL): This variable is an intended proxy for access to NLI of rural households. Agricultural labourers are resource poor and depend, to a great extent, on selling their labour for survival. Poverty among them is very high. The co-efficient of RAGL, which is negatively related to access to NLI, is anticipated to bear positive sign in the estimated labour supply function of children.

Percentage of Households Who do not Own Land Cultivated (RHLL): This variable is ,also, a proxy for households dependent only on labour income for survival. Land, apart from being the major source of livelihood in rural India, is a symbol of social status. Thus land ownership, perse, is expected to lower the supply of child labour, irrespective of whether the households earn enough to subsist from land or not (Jayaraj, 1993). This index, in its present form, over represents landlessness and non-access to NLI: includes households dependent on rural non-farm sector for survival and hence households for which land ownership not necessarily -the source of NLI. Co-efficient of this variable, which is negatively related to access to NLI, is expected to be positive in the estimated relationship.

Value of Agricultural Output Per Head of Agricultural Labour (VOUTPAGL): This variable is incorporated as a proxy for the wage rate, particularly the wage rate for adults, in the agricultural sector. The wage rate, other things remaining the same, is expected to be positively related to productivity per head of agricultural labour. In this connection the observation made by Walker and Ryan (1990) is worth recalling. They observe, analysing the data from six villages in Semi-arid Tropical India, that both crop and labour income moved in the same direction. Thus,VOUTPAGL is expected to be negatively related to the supply of child labour.

Gross cropped Area Per Head of Rural Population (GCAP): This variable is a crude proxy for availability employment in the agricultural sector. It is anticipated that, other things remaining equal, the higher the availability of gross cropped area per head of rural population, the greater will be the number of days employment available in the crop sector , in general, and in particular for adult wage earners. For this reason, this variable is expected to exhibit negative relationship with supply of child labour.

Tractor Available Per Thousand Hectare of Gross Cropped Area (TRPH): This variable is a proxy for labour displacing technical transformation that affects the labour market conditions in the agricultural sector. Tractorisation is expected to result in reduction in labour demand, particularly the demand for labour for operations such as preparatory tillage and harvesting. Thus, tractorisation weakens the bargaining position of the agricultural labourers on the one hand, and on the other, affects directly the availability of employment per head of an agricultural labourer. Thus, TRPH is expected to be related: negatively to WIA; and positively to supply of child labour.

Fertilizer Used Per Hectare of Gross Cropped Area (FERTPH): This variable is introduced in to the analysis as proxy for labour augmenting technological transformation in the crop sector. 'A

priori' the sign of the co-efficient is indeterminate as the type of labour demand that results as a consequence of intensive use of fertilizer is difficult to predict. The available evidence from Vemuri and Sastry (1991), however, suggests a positive relationship between fertilizer consumption per hectare and labour force participation of children.

Percentage of Gross Cropped Area Irrigated (IRRI): This variable is incorporated as a proxy for Instability in earnings of households in the agricultural sector, particularly agricultural labour households. Availability of irrigation determines cropping pattern, input use, instability in yield and cropping intensity. Walker and Ryan (1990) conclude that (a) a 10 per cent increase in proportion of land irrigated lead to 3 to 6 per cent increase in labour use per hectare of gross cropped area of a village and (b) variation in cropping intensities across villages are mainly attributable to differences in irrigation potential. Labour use within a crop season increases as a result of changes in cropping pattern - less labour intensive crops such as inferior cereals to more labour intensive crops such as paddy and sugar cane, and intra-year fluctuations in labour use decline as a consequence of increase in cropping intensity. This sort of tightening of the rural labour market both within and between seasons, which accompany the extension of irrigation, is expected to result in more stable earnings, in general for workers in the agricultural sector, and in particular for adult agricultural labourers. Thus IRRI, which is related inversely with Instability, is expected to have negative impact on supply of child labour.

Percentage of Children Attending School (SCHA): This variable is a proxy for education related factors. School attendance reflects: access to formal education facilities; general level of prosperity; and attitude of parents towards education. It is, also, a direct determinant of supply of child labour. For these reasons, SCHA, is expected to be inversely related to supply of child labour.

Percentage of Schedule Caste and Tribe Population to Total Population of the District (RSCST): This variable represents sociological factors. Schedule caste and Tribe population are the most disadvantaged section of India's population. They are both resource and income poor and poverty among them is very high. To quote Walker and Ryan (1990), "the ranks of the poor are disproportionately filled by the landless and the members of Harijan community who suffer from low caste status. Demographic considerations loom large in separating almost always poor". Thus the co-efficient of RSCST is expected to be positive in the estimated supply function of children.

Given the rationale for incorporating the various variables and the 'a priori' expectations on the signs of the co-efficients, assuming linear[5] relationship between LFPR and its determinants, equation 5 can be written as follows:

$$LFPR_i = b_0+b_1VOUTPC_i+b_2LGINI_i+b_3RAGL_i+b_4RHLL_i+b_5VOUTPAGL_i+b_6GCAP_i$$
$$+b_7TRPH_i+b_8FERTPH_i+b_9IRRI_i+b_{10}SCHA_i+b_{11}RSCST_i+U_i \quad ...(6).$$

All the variables in equation 6 are as defined earlier and U_i is the random error term that obeys all the restrictions in OLS estimation. Equation 6 has been estimated separately for males and females, respectively for LFPR estimated including and excluding marginal workers (denoted respectively as LFPR(TW) and LFPR(MW)). Data collected for 264 districts[6] are used for estimating the equations. The next section presents the results and discussion.

5. Results and Discussion

As a preliminary step, matrix of correlation co-efficients among all included variables has been computed and the results are presented in Appendix 2. The results indicate the presence of

strong collinearity between: TRPH, VOUTPC, IRRI, and FERTPH; and RAGL,SCHA of female children and RHLL. Collinearity, as it is evident from the literature, when not perfect impairs the precision of the estimates. In this paper, regression technique is used as an exploratory, and not as a diagnostic, statistical tool. Consequently, collinearity is not a major problem in the analysis. However, the hypothesised relationships are estimated both retaining and excluding the collinear variables, the co-efficient of which are not statistically significant.

In the course of the analysis, shift in the relationship between VOUTPC and LFPR of male child labour has been observed. An intercept dummy (D_1), for capturing the impact of the structural shift, has been incorporated into the supply function of male child labour. D_1, the dichotomous variable takes values 1, if VOUTPC is greater than or equal to 3, and 0 otherwise.

The regression equation 6 and the modified equations - obtained by excluding TRPH and RHLL, and incorporating D_1 in the equations for males - are estimated by the ordinary least square method and the results are presented accordingly in Tables 4 and 5. The R^2s' presented in these tables indicate that a little over 50 per cent of the total variation in supply of child labour, irrespective of the sex and the definition of workers adopted, across districts are explained by the variables included. The 'F' statistics presented suggest that the estimated equations are significant at 5 per cent level.

The results indicate, in general, the importance of both economic and non-economic factors in explaining the variation in supply of child labour across districts. In addition, they indicate that the interaction between economic and non-economic factors in determining supply of child labour is complex , and that

the nature of this interaction is different for the two sexes. For example, the impact of school attendance while is negative and very strong for male children, is positive and very weak for females. The positive impact observed for females contradicts 'a priori' expectation, which is fuzzling at first sight. An in depth reasoning, however, suggests that the result reflects the impact of social attitude towards females stepping out their homes either for studies or for taking part in the production process. More generally, the result reflects the society's attitude towards female socialisation. It may, also, be that the female children share the responsibilities of women such as child care, firewood gathering and water collection, while the male children usually escape these responsibilities. These responsibilities not considered as gainful employment for the purpose of identifying workers, on the one hand, forbid school attendance of female children, and on the other hand, leads to listing[7] them as non-workers. Another important factor, social attitude on investment in education of male and female children, also, might have conditioned the observed results. Society views money spent on education of female children as expenditure, and that on male children as investment. Thus, these factors which are different for the different sexes explain both the violation of 'a priori' expectation and the differences in the observed results.

Co-efficient of VOUTPC, the proxy for NLI of households, is negative and significant for females, whereas for males it is positive and not significantly different from zero at 5 per cent level. However, the co-efficients of shift dummy are negative in both the equations for males - one of them is significant. These results, also, indicate the complex interplay of sociological and economic factors. Labour force participation of female children is considered as degrading by the society. Thus as income from land increases labour force participation of female children declines

continuously. On the other hand, participation in the production process by male children seems to be viewed by the society as a process of learning by doing and a smooth process of taking over the family enterprise by younger members of the household. But at very high levels of income the family may consider diversifying the occupational structure of the family. Thus, they provide formal education to male children with an eye on reaping the benefits of education. Hence, only at fairly high levels of income, we observe a downward shift in the supply of male child labour. This may be partly, if not entirely, the reason for differential dropout rates for males and females from schools. At this juncture, the data set does not permit testing this reasoning any further, and hence is left as an hypothesis for further research.

Gross cropped area per head of rural population exhibits perverse relationship. It may be recalled, that this variable has been introduced, assuming other things equal, as a proxy for number of days employment available in the crop sector. But other things, particularly productivity per hectare of gross cropped area displays strong negative association with PAREA (as measured by the correlation co-efficient is -0.4274, which is significantly different from zero at 1 per cent level). The observed association suggests that availability of gross cropped area per head of rural population, contrary to our expectation reflects the impact of poor agricultural development across districts. This result, while justifying the perverse relationship observed, also, indicates that increasing productivity of land will bring down , considerably, the supply of child labour.

Co-efficients of IRRI and VOUTPAGL are as expected negative and significant in all the regressions. Co-efficient of irrigation confirms that supply of child labour, as hypothesised, is risk combating or coping up strategy by poor households to the inherent

instability in earnings and income of unirrigated agriculture. Vidyasagar (1991), also, identifies that labour force participation of children is much lower in a village better irrigated than in a village, relatively, poorly irrigated. The co-efficient of VOUTPAGL, confirms that increase in wage rate reduces supply of child labour.

Co-efficients of RAGL and RSCST, indicate resource poverty and caste discrimination result in significant increase in supply of child labour. These results suggest that deprivation of access to productive resources, particularly land, and caste discrimination, deprive children from accumulating human capital and ensure that the vicious circles of poverty and supply of child labour perpetuate.

In brief, the analysis brings out clearly the complex interaction of economic and non-economic factors in determining the supply of child labour. In the next section, taking in to account the complex interaction of the various forces, certain policy measures to eradicate child labour and direction for further research are offered.

6. Concluding Observations

Supply of child labour, though is viewed as inescapable response by poor families to economic forces, needs to be eradicated. In this context, ignoring the complex interplay of the various factors - sociological and economic ones - , and treating child labour as uni-dimensional problem, results in advocating a single policy measure - compulsory universalisation of primary education, which will not in itself serve the purpose. Consequently, a package of policy measures aimed at: alleviation of endemic poverty, attacking caste and sex discrimination, and improving the general awareness of the society on the benefits of education, is needed.

Any poverty alleviation programme, that aims at eradicating endemic poverty, must include land redistribution, in addition to productivity enhancing and income stabilising measures, particularly extension of irrigation. In this connection - particularly in relation to the importance of land redistribution - the views of Tyler Ghonemy and Couvereur (1993) are pertinent. They are of the opinion that reliance solely on growth of output is likely to condemn the poor to continued poverty for a couple of generations and that for eradicating poverty, redistribution of resources, particularly land must accompany the growth of output. Apart from land redistribution and extension of irrigation, as indicated earlier, compulsory universalisation of primary education, and measures to combat sex and caste discrimination must, also, form part of the package of policy measures.

The analysis of the paper offers leads on direction for further research. The inter-relationships between economic development, sex and caste discrimination and supply of child labour need to be probed. The effect on the supply of child labour of certain crucial social attitudes could be fertile ground for further research; of particular relevance on the social attitudes in respect of female socialisation, investment on education, and sharing of responsibilities within the household by children of different sexes.

Notes

1. We have selected 14 major states, excluding Assam, for in 1981 Census had not been conducted in Assam.

2. Nagaraj (1989), is also of the opinion that Census data could be used to capture the variability in labour force participation rates across space at a given point of time.

3. The importance of struggle for survival on child labour can ,also, be deduced from the works such as Fyfee (1989) Weiner (1991) Dingwaney et al (1988) and Vidyasagar (1991).

4. Fertility has not been incorporated into the supply function as the direction of causality between supply of child labour and fertility is not clear. The relationship appears to be complex as among poor households: fertility and infant mortality are high; age at marriage and level of education are low, particularly among poor women, and supply of child labour is high. It appears that poverty is the common cause of all the factors listed above, and hence I have not included fertility into the supply function.

5. I have, also, fitted other functional forms to the data and found that linear function yields better fit.

6. Selection of districts and the states are discussed in the Appendix on data.

7. The problem at first sight, may appear to be a problem of definition of work and hence a data problem. In reality, the problem is not only a definitional problem, but more importantly a sociological problem. To be more precise, job description or allocation of work within the household which emerges from societys' inhibitions on socialisation of women that prohibits females from taking active part in the production process is the source of this problem. Thus, it has to be seen as a sociological problem rather than as data problem.

Appendix 1

Districts Selected

We have selected all the districts of the 13 major states: Andhrapradesh, Bihar, Gujarat, Haryana, Karnataka, Madhyapradesh, Maharastra, Orissa, Punjab, Rajasthan, Tamilnadu, Uttarpradesh and West Bengal. In this connection, it may be pointed out that Assam and Kerala; the other major states of India, have been excluded for (a) Census had not been conducted for Assam in 1981, and (b) Kerala exhibits a different settlement pattern. Further, the number of districts in these selected states, according to Census 1981, and the number of observations do not tally as (a) district such as Madras which is exclusively a urban district, and districts such as Kanyakumari and Nilgiris that exhibit different settlement pattern have been excluded and (b) according to availability of data on other related variables some of the selected districts have been merged and treated as one unit (for details, see Bhalla and Tyagi (1989). Thus the number of observation or districts have been reduced to 264.

Source of Data

As indicated earlier, for the major part of the analysis of supply of child labour, we relied on Population Census 1981. Accordingly, data on: Total population, Population of Schedule Caste and Tribe, Number of cultivators and agricultural labourers have been called from Primary Census Abstract, part II-b(i), Total population in the age group 5-14, Number of children attending school in the age group 5-14, Number of workers (main and marginal) have been called from Census of India, Social and Cultural Tables, part IV-A, for the various states. Data on number of households which do not own

land cultivted have been called from Census of India, Household Tables, part VIII A & B(iii).

Data on Value of output, Fertiliser, Number of Tractors available, Gross cropped area and Gross cropped area irrigated are called from Bhalla and Tyagi (1989). It may be pointed out that Value of output and Gross cropped area are averages for the period 1980-83, that correspond to 41 major crops identified across districts. Gini coefficient of land concentration for districts have been obtained from Mitra (1980) which corresponds to 1970-71. In this regard, it may be pointed out that Gini coefficient of land concentration for 1970-71 has been used as proxy for land concentration in 1980-81, on the assumption that land concentration has not changed much in this decade. Value of output has been evaluated using single price series that corresponds to 1969-70. Thus VOUTPC and VOUTPAGL capture only the variability in NLI and wage rate that arises due to variability in output measured in physical units.

Appendix 2

Matrix of correlation co-efficients

Variables	VOUTPC	VOUTPAGL	RAGL	RHLL	IRRI	LGINI	GCAP	TRPH	FERTPH	RSCST	SCHA(M)	SCHA(F)	LFPR(TW)	LFPR(MW)	LFPR(TW)	LFPR(MW)
VOUTPC	1.000															
VOUTPAGL	0.375	1.000														
RAGL	0.251	-0.539	1.000													
RHLL	0.554	-0.285	0.729	1.000												
IRRI	0.592	0.359	0.023	0.155	1.000											
LGINI	-0.144	-0.140	0.010	-0.042	0.113	1.000										
GCAP	0.135	0.402	-0.150	-0.097	-0.190	-0.312	1.000									
TRPH	0.701	0.471	-0.082	0.225	0.616	0.124	0.047	1.000								
FERTPH	0.655	0.243	0.170	0.287	0.745	0.058	-0.264	0.503	1.000							
RSCST	-0.117	-0.083	-0.099	-0.098	-0.254	0.005	0.016	-0.111	-0.243	1.000						
SCHA(M)	0.344	-0.030	0.214	0.419	0.180	-0.061	-0.152	0.245	0.311	-0.260	1.000					
SCHA(F)	0.404	-0.101	0.406	0.601	0.169	-0.122	-0.195	0.246	0.417	-0.141	0.860	1.000				
LFPR(TW)	-0.129	-0.251	0.230	0.042	-0.403	-0.117	0.338	-0.305	-0.201	0.385	-0.489	-0.240	1.000			
LFPR(MW)	-0.092	-0.247	0.266	0.073	-0.350	-0.101	0.319	-0.275	-0.222	0.263	-0.410	-0.232	0.909	1.000		
LFPR(TW)	-0.297	-0.302	0.243	0.056	-0.523	-0.045	0.265	-0.421	-0.364	0.288	-0.052	-0.037	0.001	0.756	1.000	
LFPR(MW)	-0.267	-0.456	0.379	0.159	-0.436	0.029	0.178	-0.394	-0.242	0.166	-0.026	0.022	0.747	0.739	0.943	1.000

Note: SCHA(M) and SCHA(F) respectively refers to School Attendance of Males and Females.

Table 1.

Number and Percentage Distribution of Workers in the Age Group 5-14, by Location (in 000's)

Source of Data	Rural			Urban		
	Male	Female	Total	Male	Female	Total
Census 1981						
a) Main Workers	6696 (90.06)	3505 (93.29)	10201 (91.15)	739 (9.94)	252 (6.71)	991 (8.85)
b) Main and Marginal Workers	7340 (90.50)	5872 (94.80)	13212 (92.37)	770 (9.50)	322 (5.20)	1092 (7.63)
NSS 1983						
a) Principal Status Workers	8434 (88.94)	5903 (91.36)	14337 (89.92)	1049 (11.06)	558 (8.64)	1607 (10.08)
b) Principal and subsidiary Status Workers	10130 (88.78)	8327 (92.05)	18457 (90.23)	1280 (11.22)	719 (7.95)	1999 (9.77)

Source: (1) NSS, Report on the Third Quinquennial Survey on Employment and Unemployment (January-December 1983), Department of Statistics, New Delhi, No 341, November 1987.

(2) Census of India, 1981, Part-IVa, Social and Cultural Tables, (Tables C-1 to C-6).

Table 2.

Labour Force Participation of Children, NSS 1983 (Rural)

State	Children 5-14			
	Principal Status		Principal and Subsidiary Status	
	Male	Female	Male	Female
1. Andhrapradesh	23.16	18.06	24.17	20.43
2. Bihar	7.51	4.71	8.95	7.93
3. Gujarat	8.50	8.78	11.11	12.30
4. Haryana	5.80	5.24	7.68	9.72
5. Karnataka	19.17	14.52	20.65	17.78
6. Kerala	1.85	1.21	3.43	3.09
7. Madhyapradesh	13.95	11.70	15.40	14.73
8. Maharashtra	12.41	13.39	15.00	16.17
9. Orissa	15.26	10.46	16.09	13.22
10. Punjab	13.54	1.35	20.85	9.78
11. Rajasthan	13.65	20.21	17.64	27.05
12. Tamilnadu	14.04	14.63	15.44	17.72
13. Uttarpradesh	8.62	4.49	12.15	8.98
14. West Bengal	8.70	2.05	10.87	5.26
India	11.27	8.84	13.54	12.48

Source: NSS, Report on the Third Quinquennial Survey on Employment and Unemployment (January-December 1983), Department of Statistics, New Delhi, No.341, November 1987.

Table 3.

Labour Force Participation of Children, Census 1981 (Rural)

State	Children 5-14			
	Main Workers		Main and Marginal Workers	
	Male	Female	Male	Female
1. Andhrapradesh	16.66	12.92	17.38	15.71
2. Bihar	6.92	2.58	7.69	4.21
3. Gujarat	8.45	4.37	9.38	8.32
4. Haryana	6.61	1.90	7.44	4.63
5. Karnataka	14.47	8.76	15.32	12.21
6. Kerala	1.14	1.11	1.59	1.55
7. Madhyapradesh	12.83	9.50	14.23	13.67
8. Maharashtra	10.70	9.90	11.18	10.09
9. Orissa	11.29	3.70	12.75	7.86
10. Punjab	9.01	0.46	9.50	2.40
11. Rajasthan	8.94	4.98	10.19	9.71
12. Tamilnadu	10.14	8.51	10.78	10.40
13. Uttarpradesh	6.74	1.58	7.13	2.52
14. West Bengal	6.56	1.34	7.12	2.00
India	9.17	5.22	10.05	8.75

Source: 1) Census of India 1981, Part IV-A Social and Cultural Tables (Tables C-1 to C-6).

2) Census of India, 1981, Part II B(i), Primary Census Abstract: General Population.

Table 4.
Regression Results of Equation 6.

Variables	Male LFPR(TW)	Male LFPR(MW)	Female LFPR(TW)	Female LFPR(MW)
VOUTPC	0.4074	0.3476	-0.6841*	-0.9102**
	(1.524)	(1.381)	(1.905)	(3.232)
RHLL	-1.4168	-0.7554	-0.5638	2.0969
	(0.489)**	(0.227)**	(0.144)*	(0.683)**
RAGL	0.0236	0.0253	0.0271	0.0323
	(2.633)	(2.992)	(2.286)	(3.483)*
LGINI	-0.0171	0.4614	7.4265	8.8987
	(0.005)**	(0.139)**	(1.575)**	(2.406)**
IRRI	-0.0614	-0.0546	-0.0725	-0.0528
	(4.077)	(3.851)	(3.521)	(3.268)
TRPH	-0.2068	-0.1837	-0.3201	-0.2256
	(1.500)**	(1.416)**	(1.750)**	(1.573)**
VOUTPAGL	-0.2321	-0.2075	-0.3083	-0.2491
	(3.337)**	(3.169)**	(3.332)**	(3.434)**
FERTPH	0.0295	0.0334	0.0411	0.0533
	(2.640)**	(3.175)**	(2.702)**	(4.469)**
GCAP	7.3223	6.7498	11.5928	9.2545
	(6.583)**	(6.446)**	(7.725)	(7.865)
SCHA	-0.1632	-0.1707	0.0397	0.0203
	(7.216)**	(8.019)**	(1.410)**	(0.919)**
RSCST	0.0538	0.0404	0.0931	0.0468
	(3.699)**	(2.951)**	(4.928)	(3.157)
Constant	14.6921	13.7827	-1.0436	-4.1201
	(5.742)	(5.722)	(0.336)	(1.691)
R^2	0.5252	0.5169	0.5046	0.5083
F-Statistic	25.1346	24.3171	23.1498	23.4924
N	262	262	262	262

Note: Figures in parentheses are 't' values.

* Significant at 5 per cent level.

** Significant at 1 per cent level.

Table 5.

Regression Results of Modified Equation 6.

Variables	Male		Female	
	LFPR(TW)	LFPR(MW)	LFPR(TW)	LFPR(MW)
VOUTPC	0.3178	0.2828	-0.9991**	-1.0191**
	(1.472)**	(1.378)**	(3.584)**	(4.593)**
RAGL	0.0269**	0.0289**	0.0295**	0.0381**
	(3.621)**	(4.086)**	(3.036)**	(4.916)*
LGINI	-2.4908	-1.7597	6.1511	7.8168
	(0.732)**	(0.544)**	(1.391)**	(2.221)**
IRRI	-0.0630**	-0.0565**	-0.0750**	-0.0560**
	(4.371)**	(4.126)**	(3.750)**	(3.521)**
VOUTPAGL	-0.2220**	-0.2017**	-0.3123**	-0.2636**
	(3.319)**	(3.171)**	(3.494)**	(3.705)**
FERTPH	0.0294**	0.0329**	0.0393**	0.0510**
	(2.746)**	(3.239)**	(2.698)**	(4.325)**
GCAP	7.2095**	6.6380**	11.5788**	9.1683**
	(6.674)**	(6.462)**	(7.871)**	(7.829)**
SCHA	-0.1673**	-0.1736**	0.0420	0.0260
	(7.874)**	(8.592)**	(1.592)**	(1.238)**
RSCST	0.0535**	0.0399**	0.0954**	0.0470**
	(3.756)*	(2.945)**	(5.142)**	(3.184)**
D1	-1.0921**	-0.9032**	-	-
	(1.835)**	(1.596)**		
Constant	15.8366**	14.9067**	-0.5336	-3.1637
	(6.548)**	(6.482)**	(0.184)	(1.374)
R^2	0.5309	0.5188	0.5029	0.5021
F-Statistic	28.2935	26.9526	28.2118	28.1273
N	261	261	261	261

Note: Figures in parentheses are 't' values.

* Significant at 5 per cent level.

** Significant at 1 per cent level.

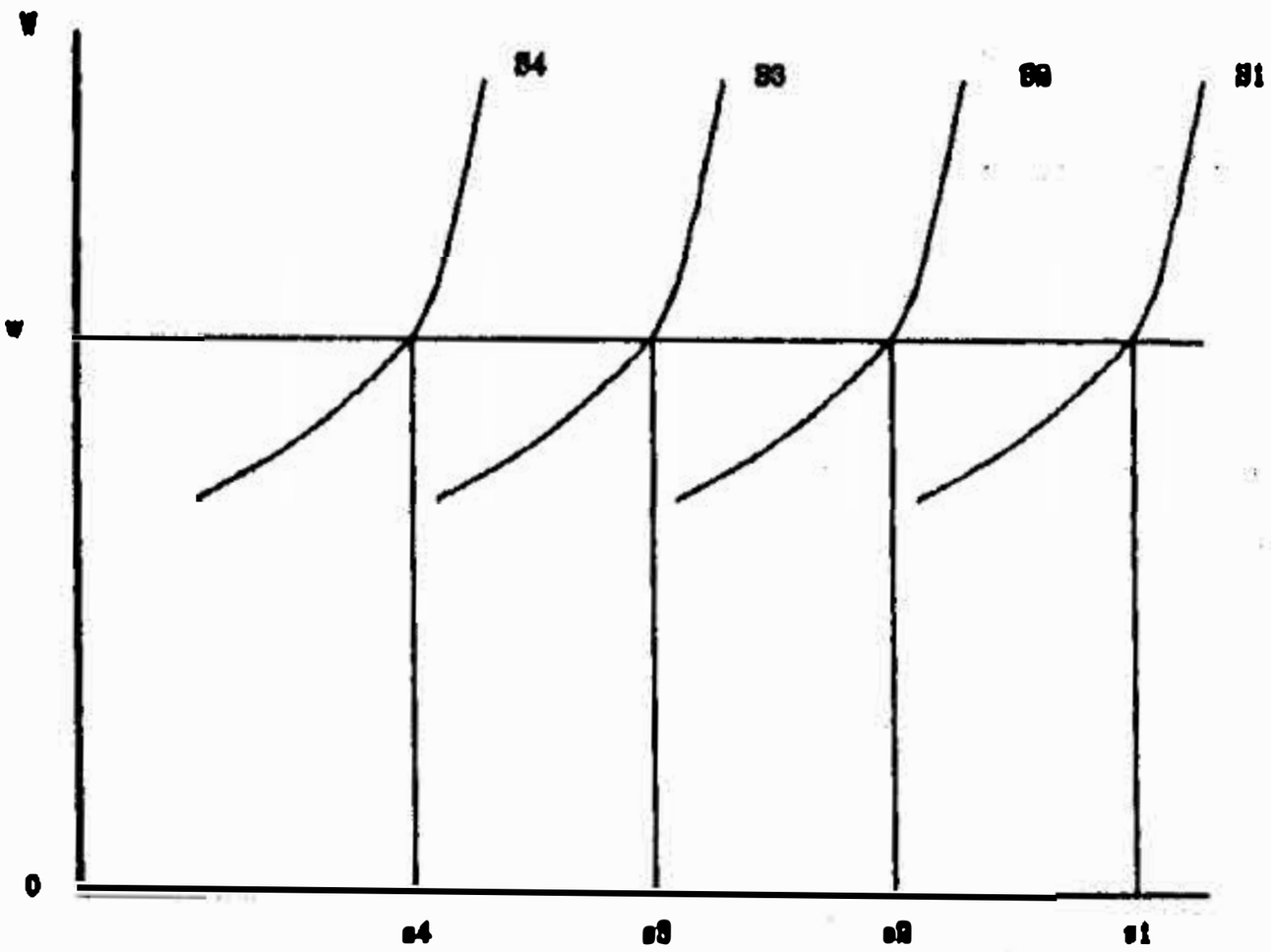

Figure 1: Labour Supply Curves of Individuals with Different Levels of Non-Labour Income.

References

1. Bhalla,G.S. and Tyagi,D.S (1989) Patterns in Indian Agricultural Development: A District Level Study, Institute for Studies in Industrial Development, New Delhi.

2. Dobb, M (1928) Wages, Nisbet and Co Ltd., Cambridge, London, at the University Press.

3. Dingwaney, M etal (1988)Children of Darkness: A Manual on Child Labour in India, Rural Labour Cell, B4/140 Safdarjung Enclave, New Delhi.

4. Fyfee, A (1989)Child Labour, Polity Press, 65 Bridge Street, Cambridge, CB 21, 1UR U.K.

5. Jayaraj, D (1993) "Labour Force Participation of Women and Children in Rural Tamil Nadu: An Analysis of the Inter- District Variability" Working Paper No.111, Madras Institute of Development Studies, Madras.

6. Mitra, A and Mukerji, S (1980) Population Food and Land Inequality in India 1971: A Geography of Hunger and Insecurity An ICSSR/JNU/FPF Study, Allied Publishers Pvt.Ltd.

7. Nagaraj, K (1989)"Female Workers in Rural Tamilnadu - A Preliminary Study" in Jose, A.V, ed, Limited Options: Women Workers in Rural India, ARTEP, ILO, CH 1211, Geneva 22, Switzerland.

8. Rosenzweig, M.R (1984)"Determinants of Wage Rates and Labour Supply Behaviour in the Rural Sector of a Developing Country" in Binswanger, H P and Rosenzweig, M R, ed, Contractual Arrangements, Employment and Wages in Rural Labour Markets in Asia, Yale University Press, New Haven and London.

9. Tyler, G.J, Raid El-Ghonemy and Couvereur, Y (1993) "Alleviating Rural Poverty Through Agricultural Growth", The Journal of Development Studies, Vol 29 No.2.

10. Vemuri, M.D and Sastry, U.V.K.V (1991) "Participation of Children in Economic Activity: A Regional Analysis of Rural India", in Kanbargi R, ed, Child Labour in the Indian Subcontinent: Dimensions and Implications, Sage Publications India Pvt.Ltd., New Delhi.

11. Vidyasagar, R (1991) "The Lost Childhood: In the Sweat shops of Sivakasi", Frontline, Aug 31-Sep 1991, Vol.8, No.18.

12. Walker, T.S and Ryan, J.G (1990) Village and Household Economies in India's Semi-arid Tropics, The Jhons Hopkins University Press, Baltimore and London.

13. Weiner, M (1991)The Child and the State in India, OUP, Walton Street, Oxford OX2 6DP.

Reports

Census of India 1981, Part IV-A Social and Cultural Tables for the various States.

Census of India, 1981 Part VIII A & B (iii), Household Tables, Table HH-5.

Census of India 1981 Part II-B(i) Primary Census Abstract, General Population.

Title of Paper : Public investment and technology choice in the road transport sector: Its effects on industrial growth in Madras

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Abstract of Paper

This paper studies the growth of the automobile industry in Madras in the first decade after independence. The major feature of this period was the beginning of the technical collaborations that were to decide the Indian product-range for the next several decades, the initial attempts at adapting technologies especially in connection with dieselization, the intervention of the Tariff Commission and licensing in choice of firms and products, and in effecting a transition from imports to assembly to indigenous manufacture. The paper concludes that a collaboration-guided development restricted indigenous capabilities via "learning by copying", while licensing implicitly discriminated against small firms. And this pattern of development restricted indigenous growth of technologies, explaining why imported technologies were successful, and the headstart of Madras was lost, in the mid 1980s.

Acknowledgement .

This paper has been accepted for publication in the Indian Economic and Social History Review. I am grateful to the referee for comments, and to S.Neelakantan, for sharing his detailed knowledge of developments in private road passenger transportation in Madras. These developments, of obvious importance to the concerns of this paper unfortunately will, by their very nature, remain undocumented. I am also grateful to T. Maheswari for her help in word processing several rounds of this paper.