WPS 1905

POLICY RESEARCH WORKING PAPER 1905

Child Labor in Côte d'Ivoire

Incidence and Determinants

Christiaan Grootaert

Most children in Côte d'Ivoire perform some kind of work. In rural areas, more than four of five children work, with only a third combining work with schooling.

The World Bank
Social Development Department
March 1998

Summary findings

Child labor in Côte d'Ivoire increased in the 1980s because of a severe economic crisis. Two out of three urban children aged 7 to 17 work; half of them also attend school. In rural areas, more than four out of five children work, but only a third of them manage to combine work with schooling.

Full-time work is less prevalent, but not negligible. Roughly 7 percent of urban children work full time (an average 46 hours a week). More than a third of rural children work full time (an average of 35 hours a week), with the highest incidence in the Savannah region.

The incidence of such full-time work rises with age but is by no means limited to older children. The average age of the full-time child worker in Côte d'Ivoire is 12.7. These children have received an average 1.2 years of schooling. That child is also more likely to be ill or injured and is less likely to receive medical attention than other children.

Urban children in the interior cities are far more likely to work and their working hours are much longer. Among rural children, those in the Savannah region (where educational infrastructure lags far behind the rest of the country) are most likely to work.

Five factors affect a household's decision to supply child labor:

- The age and gender of the child (girls are more likely to work, especially when the head of household is a woman).
- The education and employment status of the parents (low parental education is a good targeting variable for interventions).
- The availability of within-household employment opportunities.
- The household's poverty status.
- The household's location (calling for geographical targeting).

With improved macroeconomic growth, it is hoped, child labor will decline — but a significant decline could take several generations. Meanwhile, it is important to:

- Use a gradual approach toward the elimination of child work by aiming initial interventions at facilitating combined work and schooling.
- Support the development of home enterprises as part of poverty alleviation programs, but combine it with incentives for school attendance.
- Make school hours and vacation periods flexible (accommodating harvest times) in rural areas. This would also improve children's health.
- Improve rural school attendance by having a school in the village rather than 1 to 5 kilometers away.
- Improve educational investment in the Savannah.

This paper is a product of the Social Development Department. The study was funded by the Bank's Research Support Budget under the research project "Child Labor: What Role for Demand-Side Interventions" (RPO 680-64). Copies of the paper are available free from the World Bank, 1818 H Street NW, Washington, DC 20433. Please contact Gracie Ochieng, room MC5-158, telephone 202-473-1123, fax 202-522-3247, Internet address gochieng@worldbank.org. March 1998. (75 pages)

Social Development Department
Environmentally and Socially
Sustainable Development Network
The World Bank

Child Labor in Côte d'Ivoire: Incidence and Determinants

Christiaan Grootaert*

---

* Senior Economist, Social Development Department, The World Bank.

The author would like to thank the National Institute of Statistics of Côte d'Ivoire for making the data set available for this study. Thanks also are due to Gi-Taik Oh, who managed the data base and programmed all the computer calculations, to Kimberly Cartwright and Harry Patrinos—colleagues in the comparative study "Child Labor: What Role for Demand-side Interventions" (RPO 680-64)— for many helpful discussions on the topic of child labor, and to Ravi Kanbur, Roger Key, Felicia Knaul and John Mcintire who provided valuable comments on an earlier draft of this paper.

Child Labor in Côte d'Ivoire: Incidence and Determinants

TABLE OF CONTENTS

Page

1. Introduction 1

2. Trends in Child labor in Côte d'Ivoire in the 1980s 6

3. Child Labor and Schooling in 1988 15

4. Multivariate Analysis 27

   A Model for the Determinants of Child Labor 31

   Results for Urban Areas 40

   Results for Rural Areas 52

5. Conclusions 63

Appendix: Multinomial Logit Results 68

References 73

1. Introduction

Child labor is prevalent in the developing world but the estimates vary widely. The ILO estimated that in 1990 there were about 78 million economically active children under the age of 15 (Ashagrie, 1993). UNICEF (1991) estimated that there were 80 million children aged 10-14 who undertook work so long or onerous that it interfered with their normal development. Recently, the ILO (1996) has increased its estimates to 120 million working children in the ages 5-14 who are fully at work. If part-time work is included, the total number of working children approaches 250 million. Labor force participation rates for children 5-14 vary greatly from country to country, ranging from close to zero in most developed countries to an average of 20% in Latin America and 40% in Africa.

Most empirical work on the incidence and determinants of child labor covers a sub-national area, often one or a few villages, at best a province or region. (Reviews of the child labor literature can be found in ILO (1986) and Grootaert and Kanbur (1995)). The dearth of direct data on child labor has led many researchers to focus on the determinants of school attendance, even though it is recognized that school attendance is not the "inverse" of child labor. Nevertheless, much of this literature views schooling as the most important

means of drawing children away from the labor market (Siddiqi and Patrinos, 1995).

The range of usable policy variables extends however well beyond education. In their review of these variables, Grootaert and Kanbur (1995) discuss, the role of fertility behavior, the household's risk management, and government policies with respect to social expenditure and population control as variables which affect the supply of child labor. On the demand side, the structure of the labor market and the prevailing production technology are the two main determinants of child labor. To these economic variables must be added the legislative framework (nationally and internationally), which usually involves a ban on child labor that is rarely enforced effectively, and social factors such as advocacy, awareness raising and community-based efforts to help child workers and street children. As a final factor, war and civic strife often draw children into militia.

Each one of these variables offers several policy angles and, as discussed by Grootaert and Kanbur (1995), conventional welfare economics provides a useful framework to analyze child labor issues. The starting point is the household decision making process which must allocate children's time between labor and non-labor activities, taking into account the private returns to each. Each household will allocate the time of its children to wherever the perceived private return is highest, until the marginal return is equalized across all uses of

child time.[1] The crucial question is whether, at that point, equality is achieved with the marginal social return. When the private return of child labor exceeds the social return, there is arguably "too much" child labor and interventions are called for. These can occur in the labor market itself, in the market for education, or elsewhere, depending upon where the market failure occurs.

The key element to come out of the welfare economic analysis is that there is not a simple, or even a dominant, way of approaching the elimination of child labor. A single intervention has the potential of making the working child and its household worse off, if the intervention is not where the market failure occurs. One example is a ban on child labor imposed when child labor occurs as a result of a failure in the education market. This situation can lead to a further reduction of the child's already limited opportunity set since after the ban (assuming it is enforced) the child can neither work nor attend school. Indeed, the ban does not address the failure in the education market. Hence, an array of policy instruments is likely to be required, addressing different aspects of market failures, and taking both efficiency and distributional considerations into account.

---

[1] It is to be noted here that the private returns in question are those to the household, which can differ from the returns to the child itself. As Grootaert and Kanbur (1995) explain, the household's utility function can be dominated by the head of household and the welfare of the child may have low weights in the decision making process. These weights are a function of the nature of the intra-household bargaining process.

Empirically, the challenge is to estimate a model of the child labor decision which captures the household's behavior with respect to labor market participation, education, fertility, risk management and other relevant factors. The paper below presents one such approach, relying on a reduced-form model which portrays the child labor decision as a three-stage sequential process. An alternative view and model of the child labor decision as a simultaneous process is also presented in an appendix. The case study is for Côte d'Ivoire in 1988, in an economic setting of severe recession and, as a result, rising child labor.

One of the main difficulties in furthering the empirical analysis of the determinants of child labor is the dearth of national household surveys that include questions on labor market participation addressed at adults and children in the household. Most labor force surveys use a minimum age cut-off of 14 or 15 years, so that, by definition, most official labor force statistics will exclude child labor. This age cut-off is a matter of national practice, and not the result of international guidelines. The latter do indicate that the measurement of the economically active population must use a minimum age limit, but no particular value is specified. The guidelines mention that countries where a large proportion of the labor force works in agriculture should use a lower age limit than highly industrialized countries (Hussmanns et al, 1990).

Because of this, multi-purpose household surveys are often the best source of data on child labor. Such surveys include a wide variety of questions

on the socioeconomic conditions of the household, and employment questions are often asked with a lower age cut-off. The Côte d'Ivoire data set used in this study is a multipurpose household survey with national coverage, which recorded labor force participation for all household members aged 7 years and above.

The results of the case study confirm the validity of a multi-angled policy approach towards the elimination of child labor. In particular, the case is made for a gradual policy approach, whereby initially the combination of child labor and schooling is made more attractive, relative to only work. This presents a more realistic approach for poor households who are likely to select work options for their children, and avoids interventions which can make the child worse off.

2. Trends in Child Labor in Côte d'Ivoire in the 1980s

The investigation of the incidence and determinants of child labor in Côte d'Ivoire in this paper is based on the 1988 Côte d'Ivoire Living Standards Survey (CILSS). The CILSS was canvassed annually between 1985 and 1988 over a representative sample of 1600 households. The survey collected detailed information on employment, income, expenditure, assets, basic needs and other socioeconomic characteristics of households and their members. Over the four years, coverage and methodology of the survey were held constant so that

results are comparable over time. The survey is described in more detail in Grootaert (1986, 1993).

The years 1985-88 are of particular importance in the recent economic history of Côte d'Ivoire. Throughout the eighties the country experienced an economic recession. The downturn is attributed to the collapse of the world prices of coffee and cocoa—the country's two main export crops—in the late seventies, and to unsustainable macro-economic policies (Demery, 1994). Of the decade, 1988 was one of the worst years. Between 1987 and 1988, GDP per capita fell by 5% in real terms, but private consumption fell by almost 17%, and the poverty rate rose from 35% to 46% (Grootaert, 1995). At the same time, the labor market underwent drastic changes. As a result of the recession, employment in the formal sector (including the public sector) shrunk by 14%. Many of the workers who were laid off as well as the vast majority of labor market entrants, had to find jobs in the informal sector. Between 1980 and 1990, employment in the informal sector more than doubled, and unemployment nearly tripled. The informal sector was characterized by underemployment, low productivity work, and low earnings—on average, one-fifth of earnings in the formal economy. The incidence of poverty among informal sector workers was hence high and rose rapidly during the 1980s (Grootaert, 1996).

Table 1. Labor force participation rates				
	Abidjan	Other Cities	Rural Areas	Côte d'Ivoire
		1985		
Very poor	29.5	47.1	67.9	63.7
Mid-poor	28.1	40.5	64.7	59.6
Non-poor	33.8	40.0	64.9	50.3
All	33.6	40.6	65.2	53.4
		1988		
Very poor	–	43.8	69.0	66.4
Mid-poor	21.9	43.3	66.9	58.0
Non-poor	33.5	37.9	64.2	49.7
All	32.0	40.0	66.1	54.4

Table 1 shows the labor force participation rates in 1985 and 1988, by poverty status. Labor force participation is defined here as any form of economic activity for wages or own account, whether paid or not. Labor force participants thus consist of employees, employers, self-employed, and unpaid family workers. Two conclusions stand out from Table 1. First and foremost, labor force participation is *inversely* related to welfare level: the very poor have the highest rate of participation. This immediately dispenses with the hypothesis that the poor are poor because they do not participate in the labor force. Second, participation is much higher in rural than urban areas. This is consistent with the previous finding, since poverty in Côte d'Ivoire is higher in rural areas. (The sole exception seems to be Abidjan, where the participation of the non-poor is higher.)

Between 1985 and 1988, labor force participation did not change much. Only the very poor showed a slight increase, which suggests that the increase in

extreme poverty during the sharp economic downturn in 1987-88 was not due to falling employment among the poorest.

The disappearance of high-wage and stable jobs in the 1980s led many households to implement risk-reducing strategies, by diversifying income sources across jobs and across household members. This is reflected in the labor force participation rates by age and gender (Table 2). At the national -level, the participation rate of adult men—the key income earners for the household—was 79% in 1985. Again, this rate is inversely related to poverty status, and reaches 90% for the very poor. This inverse relation is in fact observed for all age/gender groups, but is especially pronounced for children and adolescents. Among non-poor households, 14% of children and 36% of adolescents worked, but for very poor households the corresponding percentages are 31% and 73%. By and large this relationship holds regionally as well, although the difference between poor and non-poor is greater in urban than in rural areas. (In Abidjan, the relation cannot be established because there are too few observations of poor households.)

Table 2. Age/gender specific participation rates

	Children (7-14 years)	Adolescents (15-18 years)	Male Adults (19-59 years)	Female Adults (19-49 years)	Elderly (50 + years)
1985					
Abidjan					
Very poor	0.0*	0.0*	69.3*	44.4*	0.0*
Mid-poor	0.0	0.0*	33.0	55.8	36.4*
Non-poor	2.2	11.5	65.8	41.0	52.3
All	2.1	11.3	64.6	41.4	51.7
Other Cities					
Very poor	10.5	30.3	88.1	66.5	76.9
Mid-poor	9.4	26.0	79.4	58.6	56.6
Non-poor	4.1	21.5	73.6	52.8	57.9
All	5.6	22.8	75.3	54.8	58.9
Rural Areas					
Very poor	36.1	86.6	90.8	83.7	72.7
Mid-poor	31.7	73.8	86.6	81.3	74.9
Non-poor	26.1	69.3	90.1	80.7	72.4
All	29.3	73.1	89.3	81.3	73.0
Côte d'Ivoire					
Very poor	30.6	72.6	89.7	80.4	73.1
Mid-poor	26.8	61.5	82.0	76.9	72.6
Non-poor	14.0	35.7	77.6	62.5	67.3
All	18.5	44.0	79.2	67.0	69.0
1988					
Abidjan					
Very poor	–	–	–	–	–
Mid-poor	0.0	10.0	54.8	30.6	42.9
Non-poor	0.9	7.3	67.4	38.3	45.6
All	0.8	7.7	66.4	37.4	45.1
Other Cities					
Very poor	24.0	53.8	80.0	57.5	40.0
Mid-poor	7.5	32.8	82.1	62.9	66.2
Non-poor	3.4	18.3	79.4	51.8	59.3
All	6.3	23.7	80.2	56.2	60.3
Rural Areas					
Very poor	46.3	82.7	96.2	85.0	66.4
Mid-poor	29.8	81.2	93.7	87.9	77.7
Non-poor	19.4	69.9	92.4	78.8	78.3
All	29.4	76.5	93.4	83.2	76.4
Côte d'Ivoire					
Very poor	43.9	79.6	95.2	81.4	64.3
Mid-poor	21.9	60.3	87.5	77.2	74.8
Non-poor	10.2	35.0	80.4	60.4	72.7
All	19.3	47.7	83.5	68.3	72.3

* Based on fewer than 10 observations

By 1988, under conditions of severe economic recession, participation rates of children in very poor households had risen from 31% to 44%. In the households of the mid-poor on the other hand, children's participation had fallen. The same pattern existed for adolescents. The participation of male adults increased between 1985 and 1988 for all groups, but more so for the mid-poor and very poor.

It would appear that households of all income levels responded to the recession by increasing the participation of male adults. Very poor household however also increased the participation of secondary earners, i.e. children and adolescents. (Changes in the participation of women were minor.) There were differences between urban and rural areas. The sharpest increase in participation of very poor children and adolescents occurred in cities other than Abidjan, which is an area where participation of adult members declined. This suggests that any drop in labor force participation of adults in very poor households is compensated by an increase in the participation of younger household members.

Participation rates only reflect whether household members are economically active or not, and do not measure the extent of labor supply. The latter is measured in Table 3, which shows actual hours of labor supplied per

Table 3. Average labor supply of children and adolescents

	1985			
	Hours Per Year		% of Total Household Labor Supply	
	Children (7-14 years)	Adolescents (15-18 years)	Children (7-14 years)	Adolescents (15-18 years)
	Abidjan			
Very poor	–	–	–	–
Mid-poor	–	–	–	–
Non-poor	2,181*	2,469	1.8*	4.7
All	2,181*	2,469	1.8*	4.5
	Other Cities			
Very poor	1,171*	2,059*	5.2*	9.2*
Mid-poor	1,273*	1,600*	6.5*	9.4*
Non-poor	1,040	1,459	1.7	6.7
All	1,131	1,536	2.7	7.4
	Rural Areas			
Very poor	1,275	1,709	13.6	12.3
Mid-poor	956	1,335	10.6	11.1
No-poor	848	1,293	7.2	8.7
All	962	1,375	9.2	10.0
	Côte d'Ivoire			
Very poor	1,268	1,743	12.2	11.8
Mid-poor	977	1,361	9.8	10.6
Non-poor	920	1,444	4.6	7.2
All poor	1,001	1,464	6.6	8.5
	1988			
	Hours Per Year		% of Total Household Labor Supply	
	Abidjan			
Very poor	–	–	–	–
Mid-poor	–	1,824*	–	4.6*
Non-poor	2,947*	2,469*	0.9*	2.4*
All	2,947*	2,352	0.9*	2.5
	Other Cities			
Very Poor	1,245*	2,171*	15.5*	15.7*
Mid-poor	1,473	2,101	4.7	8.2
Non-poor	1,874	2,263	2.5	7.3
All	1,538	2,196	4.0	8.1
	Rural Areas			
Very poor	1,742	1,467	26.2	10.5
Mid-poor	1,475	1,657	14.0	9.4
Non-poor	1,558	1,581	8.0	8.4
All	1,593	1,578	13.8	9.2
	Côte d'Ivoire			
Very poor	1,713	1,518	25.5	10.8
Mid-poor	1,475	1,728	11.6	9.0
Non-poor	1,619	1,754	5.2	6.8
All	1,598	1,692	10.2	8.1

* Based on fewer than 10 observations.

year by children and adolescents, and the percentage of total household labor supply that this represents.

In 1985, children who participated in the labor force worked an average of 1,001 hours per year, and adolescents worked 1,464 hours. These are very high figures. To put them in perspective, the average economically active male adult in Côte d'Ivoire worked 1,876 hours and the average economically active female adult worked 1,424 hours in 1985. Hence, adolescents put in more hours than adult women. Again, hours supplied are systematically higher in poor than non-poor households. For those children who are economically active, hours supplied are higher in urban than in rural areas. This contrasts with the participation rates, which are higher in rural areas (Table 2). In other words, fewer children and adolescents work in urban areas in Côte d'Ivoire than in rural areas, but those who do, work longer hours.

In 1988, the labor supply of children had increased by more than 50%, to 1,598 hours. Noteworthy is that this increase also took place in non-poor households, indicating how wide-spread the impact of the economic recession was.

The share in total household labor supply represented by children and adolescents is significant: in 1985 it was 15.1%, and this rose to 18.3% in 1988

(Table 3). In very poor households, however, the figures are much higher: 24.0% in 1985, and 36.3% in 1988.

Two conclusions emerge so far. First, labor supply in very poor households is higher than among other households, indicating that the quantity of labor supply is not a cause of their poverty. The key factor is hence low hourly earnings. Second, between 1985 and 1988, very poor households had to rely to an increasing extent on the work of children to compensate for falling incomes.

Children's contributions to household well-being are not limited to hours of labor supply. Many children also undertake home care activities, such as cleaning, cooking, child care, etc. that frees other household members to work for pay. Table 4 shows that this requires, on average, another 12 hours per week of children, and 14-15 hours of adolescents. These figures did not change much between 1985 and 1988 (this is also the case for adult household members). Perhaps one could have expected a decline, due to crowding out from increased labor supply, but this did not happen. The result, obviously, was reduced leisure time.

Table 4. Average time (hours per week) spent in home-care activities by economically active children and adolescents		
1985		
	Children (7-14 years)	Adolescents (15-18 years)
Very poor	12.8	17.6
Mid-poor	12.3	15.1
Non-poor	11.8	14.9
Abidjan	8.2	7.6
Other Cities	12.7	12.2
Rural Areas	12.2	16.6
All	12.2	15.4
1988		
Very poor	11.0	12.7
Mid-poor	11.9	14.6
Non-poor	13.8	13.3
Abidjan	21.0	14.1
Other Cities	10.5	10.7
Rural Areas	12.2	14.1
All	12.1	13.6

3. Child Labor and Schooling in 1988

The previous section highlighted the importance of child labor for Ivorian households in absorbing the shock of falling incomes during the recession of the 1980s. As 1988 is the last year for which the detailed data of the CILSS exist, we investigate the determinants of child labor in more detail for that year. In this section, we do so by means of tabulations, focusing on the interplay between work and schooling. The next section will consist of a multivariate analysis.

Table 5 shows that the 1,600 households in the 1988 CILSS consisted of 9,860 people, of which 5,310 (i.e. 54%) were children or adolescents. This high percentage is the result, of course, of the high population growth rate (3%) in the country. Of these children, 3,897 (73%) were children of the head of household, while the others were children of other members of the household or of non-members. This reflects the fact that extended households as well as the practice of child fostering are common in Côte d'Ivoire.

For our purposes, we have used an age cut-off of 7 years, at which point all children should legally be in school. This gives an effective sample for analysis of 2,828 children.[2]

Table 5. The 1988 CILSS Sample

	Urban	Rural	All
Households	624	976	1,600
Individuals	3,820	6,040	9,860
Children 0-17 years	2,093	3,217	5,310
Children of heads of household 0-17 years	1,538	2,359	3,897
Children 7-17 years	1,177	1,650	2,828
Children of heads of household 7-17 years	795	1,232	2,028

[2] The analysis of the CILSS data requires the use of sampling weights to reflect varying sampling probabilities. All results in this paper use these weights. The construction and use of these weights is explained in Demery and Grootaert (1993).

Each of these children and their households face the choice of allocating his/her time among five activities:

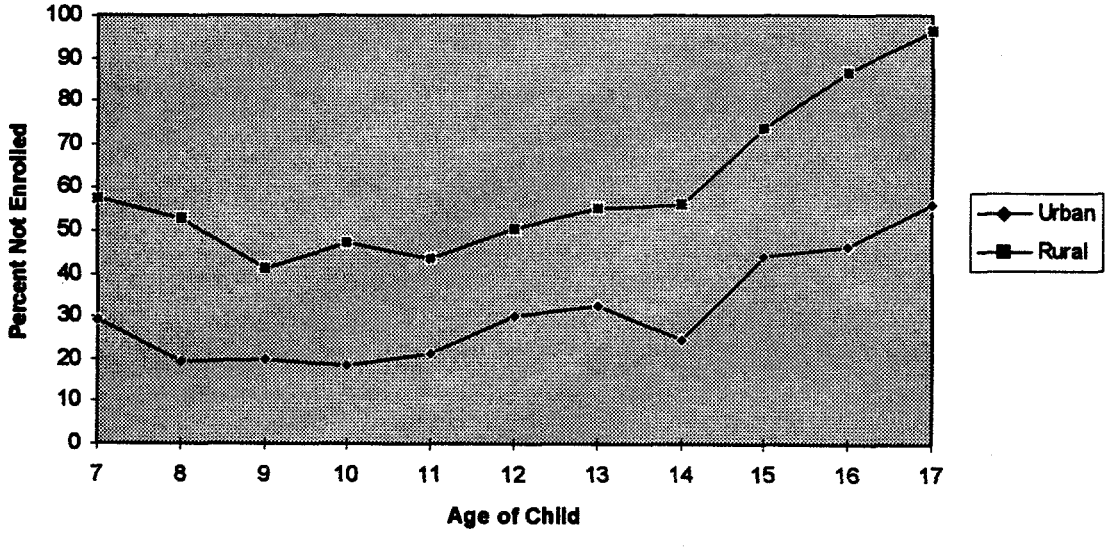
- going to school,
- working in the labor market outside the home,
- working in an enterprise or farm belonging to the household,
- helping with home care tasks, and
- leisure.

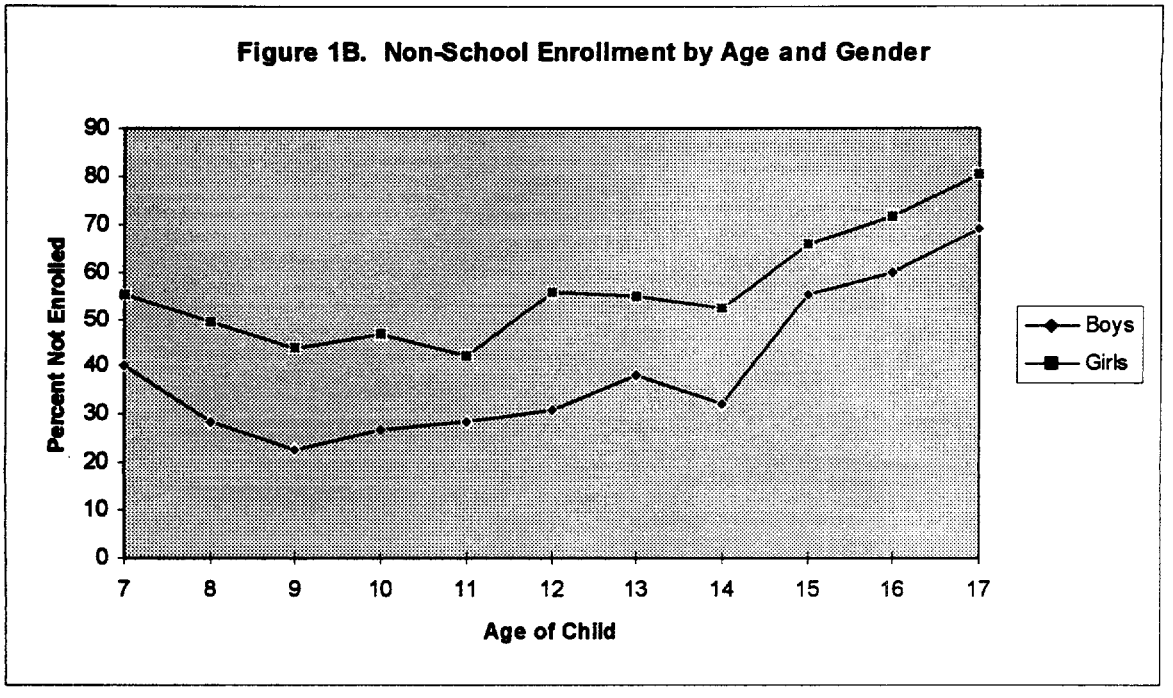
In the CILSS, there is direct information on the first four activities. Since the personal development needs of the child are best served by school attendance, it behooves to look first at the extent to which this time allocation is not chosen by the child, or more likely, for the child by the parents. By age 7, almost 50% of children in Côte d'Ivoire are not enrolled in school yet (Table 6 and Figure 1). The figure decreases to 32% at age 9, then rises steadily to the 40% range at ages 12-14. As of age 15, there is a sudden jump to above 60%. This corresponds to the end of the primary schooling cycle, at which point many children end their school careers. This calls for distinguishing in the analysis (as we have done so far), children in the 7-14 age range from adolescents in the 15-17 age range.

Table 6. Non-School Enrollment (%) by Location, Gender and Age

Age (years)	Urban (%)	Rural (%)	Boys (%)	Girls (%)	All (%)
7	29.1	57.6	40.2	55.1	47.3
8	19.4	52.8	28.5	49.5	38.6
9	19.8	41.4	22.4	44.0	32.4
10	18.3	47.4	27.0	46.8	36.1
11	21.3	43.3	28.6	42.1	34.9
12	29.9	50.4	31.0	55.8	42.4
13	32.5	54.9	38.0	54.9	46.2
14	24.6	55.8	32.1	52.4	41.4
15	44.2	73.4	55.3	65.7	60.1
16	46.2	86.7	59.7	71.4	66.0
17	56.1	96.3	69.2	80.5	74.1
All	29.2	55.4	36.1	53.9	44.5

Figure 1A. Non-School Enrollment by Age and Location





It is also clear that non-enrollment is much higher in rural than in urban areas, at all ages. There is a distinct gender dimension: at all ages, girls' school enrollment is lower than boys. The result of these location and gender differences is an important difference in educational achievement at age 17: 35.5% of urban children and 63.0% of rural children have less than complete primary education; 41.3% of girls and 51.3% of boys have completed primary education (Table 7). At age 17, the average urban child has received 6 years of education, against only 3.1 years for the average rural child. The average 17-year old boy has received 5.4 years, and the average 17-year old girl has received 3.8 years.

Table 7. Educational Achievement at Age 17

	Urban			Rural			All		
	Male	Female	All	Male	Female	All	Male	Female	All
Level of education completed									
None	23.9	47.5	35.5	61.8	65.0	63.0	42.9	54.2	47.8
Primary	64.6	45.2	55.0	38.2	35.0	37.0	51.3	41.3	46.9
Lower secondary	11.6	7.3	9.5	–	–	–	5.8	4.5	5.2
All	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Average years of education	7.2	4.7	6.0	3.6	2.3	3.1	5.4	3.8	4.7

As we pointed out earlier, children can devote their time to five activities and most children in Côte d'Ivoire combine several of these, especially work and school. For purposes of this analysis, and considering the limitations imposed by the CILSS sample size, we have classified children in 4 categories:

(1) children attending school, and not reporting any work ("school only")

(2) children attending school and reporting work ("school and work")

(3) children not attending school and reporting work ("work only")

(4) children not attending school and reporting no work or home care activities only ("home care")

The fourth category deserves some clarification. In the CILSS sample, 12% of children report no school attendance, no work inside or outside the home, and participation in home care activities. Another 10% report no school, no work, and no home care activities either. In the context of Côte d'Ivoire, it would be most unusual for children in the age group 7-17 to not attend school and to make no contribution at all to the household. We must consider the possibility of reporting errors for those cases. It is most likely that those children forgot to report home care activities, and we have therefore grouped them

together with children reporting no school, no work and home care activities. The fourth category is thus a "residual" category, for whom we have somewhat less certainty about the nature of children's activities than for the other three categories.

Table 8 shows the distribution of children across the four categories:

- Only 25% of children in Côte d'Ivoire attend school as their only activity. This represents 34% of urban children and 14% of rural children, 35% of boys and 14% of girls.

- Another 30% of children combine schooling with work inside or outside the home.[3] The figure is higher in urban areas and for girls.

- More than one in five children works as their primary activity. This situation is predominant in rural areas, where it pertains to 34% of children (against only 6.5% in urban areas). The frequency of the work-only situation rises sharply with the child's age.

[3] This is a very high figure and important feature of the child labor situation in Côte d'Ivoire. In neighboring Ghana, 19% of children combined work and school (Canagarajah and Coulombe, 1997).

- Slightly more than 20% of children report only home care activities, but the figure exceeds 30% for girls.

Table 8. School and Work: Mutually Exclusive Categories of Child Activities, by Location

		Urban (%)	Rural (%)	All (%)
All Children	School only	34.3	18.8	25.3
	School and work	36.4	25.8	30.2
	Work only	6.5	34.4	22.8
	Home care	22.8	20.9	21.7
	All	100.0	100.0	100.0
Boys	School only	48.4	27.2	35.4
	School and work	32.1	26.2	28.5
	Work only	6.0	30.9	21.2
	Home care	13.5	15.8	14.9
	All	100.0	100.0	100.0
Girls	School only	20.7	8.4	13.9
	School and work	40.6	25.3	32.2
	Work only	6.9	38.9	24.5
	Home care	31.8	27.3	29.4
	All	100.0	100.0	100.0
Ages 7-14	School only	39.3	21.3	28.5
	School and work	36.6	28.4	31.7
	Work only	3.7	27.9	18.3
	Home care	20.3	22.4	21.5
	All	100.0	100.0	100.0
Ages 15-17	School only	16.0	4.9	10.5
	School and work	35.5	11.7	23.6
	Work only	16.4	70.4	43.4
	Home care	32.0	13.0	22.5
	All	100.0	100.0	100.0

We documented in the previous section the strong link between child labor and poverty, and the fact that the poor increased the supply of child labor

the most in the 1985-88 period, in response to the economic recession. Table 9 explores this relation further for the four categories of child work and schooling. In the table, households have been ranked by income per capita (excluding the income from child labor) and grouped in quintiles. We excluded income from child labor in order to display the household situation prior to the child labor decision.

Table 9. School and Work: Mutually Exclusive Categories of Child Activities, by Income Quintiles

		Quintiles of Per Capita Household Income					
		1 (%)	2 (%)	3 (%)	4 (%)	5 (%)	All (%)
Country	School only	20.6	21.7	27.4	24.7	38.1	25.3
	School and work	23.0	25.5	31.5	38.5	38.2	30.2
	Work only	30.9	27.9	21.3	17.1	8.9	22.8
	Home care	25.5	24.9	19.8	19.8	14.8	21.7
	All	100.0	100.0	100.0	100.0	100.0	100.0
Urban	School only	33.8	28.6	37.7	26.5	43.3	34.3
	School and work	29.7	34.2	33.8	43.7	36.9	36.4
	Work only	5.1	9.9	7.6	6.0	4.5	6.5
	Home care	31.5	27.2	20.9	23.8	15.3	22.8
	All	100.0	100.0	100.0	100.0	100.0	100.0
Rural	School only	16.4	18.8	19.6	22.7	20.0	18.8
	School and work	20.9	21.8	29.7	32.8	42.7	25.8
	Work only	39.0	35.5	31.9	29.3	24.0	34.4
	Home care	23.6	23.9	18.8	15.3	13.3	20.9
	All	100.0	100.0	100.0	100.0	100.0	100.0

Over most of the income range, the incidence of the "school-only" situation shows little relation with income level. Only in households in the highest income quintile is there a clearly higher presence of children who go to

school only, and this result is at least partly attributable to the fact that most of these households live in the urban areas, where the supply of education is better. The school-work combination displays a more pronounced positive correlation with income, especially in rural areas. Conversely, children who only work are found mostly in the two lowest quintiles, and to a very large extent in rural areas.

The final task we wish to undertake in this section is to portray better the full-time child worker in Côte d'Ivoire, defined as are the children who do not attend school and report work outside the home or on a household enterprise or farm as their sole activity (i.e. category 3, "work only").

The full-time child worker is on average 12.7 years old, and has a very low average education of only 1.2 years. This category is split evenly among boys and girls, but is found much more frequently in the poorest 40% of households. Almost 90% of these child workers live in rural areas. Of those, 60% live in the Savannah, which is Côte d'Ivoire's poorest region. This is clearly a critical observation for policy interventions. Savannah is the zone where Côte d'Ivoire's main cash crops (cocoa and coffee) cannot be grown. Farmers are predominantly subsistence farmers and only cotton can provide cash income. It is also the zone that lags the most in education facilities and enrollment. We will return to this in the next section, when we undertake the multivariate analysis.

Table 10. A Portrait of the Full-Time Child Worker in Côte d'Ivoire

	Full-Time Child Worker (Category 3)	All Children 7-17
Average age	12.7	11.2
Average years of education	1.2	2.5
% Girls	50.7	50.4
% Boys	49.3	49.6
% In Poorest 40% of Households	62.1	48.0
% In Urban Areas	11.8	41.6
% In Rural Areas	88.2	58.4
Average working hours per week:		
• Boys	38.9	–
• Girls	34.2	–
• Urban	45.8	–
• Rural	34.9	–
Average hours per week spent on home care tasks:		
• Boys	9.5	7.5
• Girls	19.9	15.7
• Urban	14.2	12.4
• Rural	16.1	12.4

The children who work only, do so for an average of 34 hours (girls) to 39 hours (boys) per week, i.e. their work is truly full-time. As we observed earlier, in urban areas the work hours are much higher than in rural areas (46 and 35 hours, respectively). In addition, the full-time child workers spend many hours doing home care tasks, for an average of 9.5 hours per week (boys) and 20 hours

(girls). This is significantly more than non-working or part-time working children.

4. Multivariate Analysis.

As we mentioned in the introduction, the literature on child labor has identified several critical supply and demand factors. In the analysis below we focus on supply factors at the household level, i.e. those characteristics of the child and the household which can exercise an influence over the household's decision to allocate children's time away from schooling and towards work. We also include measures of the cost of schooling and proxies for demand factors.

Characteristics of the child. The tabular presentation in the previous sections, as well as virtually all empirical work on child labor, has indicated that the age and gender of the child are important determinants of the probability of work. The magnitude and direction of these effects are however country-specific, and determined by cultural factors, labor market opportunities, and wage patterns.

Parents' characteristics. There is ample empirical evidence that education and employment status of the parents affect the child labor decision (ILO, 1992; Grootaert and Kanbur, 1995; Patrinos and Psacharopoulos, 1995). The usual assumption is that the father's education and employment affects boys the most,

and mother's education and employment affects girls the most In the model, we include the number of years of education of each parent, and an interaction variable with the gender of the child. The nature of parents' employment also matters—if the parents have no or irregular employment, it creates the need for additional income sources to be provided by children. Due to sample size limitations, the employment aspect in the model below is captured only by a categorical variable indicating whether the parent is employed as wage earner or self-employed (i.e. excluding unpaid family workers). This variable is also interacted with the gender of the child.[4]

Household characteristics. Several demographic and economic features of the household as a unit affect the supply of child labor.[5] On the demographic side, household size and composition are of foremost importance. Ceteris paribus, the more children there are in the household, the more likely it is that one of them will work. The literature has clearly established that larger household size reduces children's educational participation and reduces parental investment in schooling (Lloyd, 1994). A larger household size decreases income per capita and increases the dependency ratio, and both factors increase the likelihood that a child will need to generate income (in cash or in kind) to maintain the household's level of living. However, each child does not have the

[4] If the parent is not a member of the household, we selected the education and employment characteristics of the oldest male or female person in the household.

[5] Cultural household characteristics could also be relevant in the child labor decision, e.g. religion. This type of information is not available in the CILSS.

same probability to be called upon to work; it depends on the child's age and gender, but also on the age and gender of the siblings present in the household (Lloyd, 1993; Jomo, 1992; De Graff et al, 1993; Patrinos and Psacharopoulos, 1997). In the model below, we enter variables that capture the numbers of siblings, by gender and age group.

We also include in the model the stage in the life cycle as captured by the age of the head of household. The gender of the head of household is also relevant because female-headed households usually have higher dependency ratios, although this can be offset by an income effect (their smaller size implies higher income per capita).

On the economic side, the key variables are the ownership by the household of income generating assets. In the model, we have included two such assets which we consider exogenous in the short term, namely, the ownership of a farm or a non-farm household enterprise.

In spite of the strong observed correlation between poverty (or income in general) and child labor, it would not be appropriate to include household income as a variable in the model, because this variable is endogenous. We have indeed already included the main household endowments of human and

physical capital that determine income.[6] We have however included a categorical variable to indicate whether the household fell in the lowest income quintile. This is not intended as an income variable, rather it captures the special constraints faced by the poorest segments of the population in terms of access to credit and insurance. This lack of access prevents a poor household from relying on outside markets to reduce income risk and is a major reason why child labor is predominant among poor households (Grootaert and Kanbur, 1995).

Cost of schooling. Since schooling is the main competing time use for children, it stands to reason that the cost of schooling would be an important determinant of the likelihood of child work (Siddiqi and Patrinos, 1995). The CILSS contains information on household expenditures for education, but these cannot be included as explanatory variables in the model because they are endogenous to the child labor decision (by definition, expenses on education are incurred only for children for whom the decision was made to enroll them in school). We have hence averaged, for each cluster in the survey, household expenditures on education per enrolled child. This average can be considered an independent measure of the cost of schooling in that cluster, and this variable has been included as a regressor in the model. We have also included the distance to the school (also averaged by cluster) as a partial measure for the opportunity cost of school attendance. Unfortunately, a direct measure of

[6] The model we estimate below is a reduced form equation. In a structural model, it would be appropriate to have a separate equation to determine household income as a function of

foregone earnings could not be calculated because there are too few cases in the CILSS for which income from child labor is reported.

Demand factors. As a household survey, the CILSS does not furnish data on employment opportunities for children. Likewise, the data on wages for children cannot be used here because the number of cases of reported wages are too few to use a cluster- or region-specific averaging procedure (as we did for the cost of schooling) to produce a useable exogenous measure of wages. Hence, the model below does not include any direct demand variables. As a (weak) proxy, we have included in the model dummy variables for the region of residence of the household.

A Model for the Determinants of Child Labor

Several formal models of the household economy that explicitly take into account the economic contributions of children have been discussed in the literature (Levy, 1985; Rivera-Batiz, 1985; Sharif, 1994). Much of this work is based on Rosenzweig and Evenson (1977). The setting is the standard constrained utility maximization model of the household. A consumption vector is maximized, subject to the resource endowment of the household and the market determined returns to these assets. A structural formulation of this

---

assets deemed exogenous. The child labor equation can then include an instrumental variable for income, e.g. its value predicted by the first equation.

household economy includes equations explaining the supply of labor of different household members, including children.

For this paper our objective is more modest. We wish to estimate a reduced-form model of the determinants of child labor. As we explained earlier, we lack demand variables in the data set and our focus is therefore on the supply side. Of course, the "conventional" policy approach to child labor has been focused on the demand side, mainly by trying to affect the behavior of owners of firms to reduce their demand for child labor, e.g. by legislation prohibiting child labor, by foreign boycotts of the products manufactured with child labor, or by increasing society's awareness of child labor and stigmatizing entrepreneurs who use child labor. As Grootaert and Kanbur (1995) have argued, the range of policy variables needs to be enhanced, in part by providing proper incentives to the households who provide the child labor. This calls for a look at the supply side, and this is the focus of this analysis. The reduced-form model estimated below contains the most relevant supply variables.

There are several ways to model econometrically the supply of child labor depending upon the view one holds about the decision making process within the household. The key aspect of this process is whether the decision maker in the household considers all options open to the child simultaneously, or whether preferred options (especially schooling) are considered first, followed by a

hierarchical decision making process.[7] As far as we know, the literature does not contain any evidence on this, and at any rate it is likely that the process differs across households. A simultaneous decision making process would call for a multinomial choice model , whereby the choices are schooling, work for wages, work in home enterprise, work on farm, no work, or variations thereof. A hierarchical decision making process can be modeled with a sequential choice model, whereby the first step models the choice between the preferred option, say, school attendance, against all other options combined. The second step models the second best choice against the remaining options, conditional upon not having opted for the first best choice. This process continues until the choices are exhausted.

There are advantages and disadvantages to each approach. The appeal of the multinomial choice approach is that only one equation needs to be estimated, which by construction, will yield a consistent set of probabilities showing the effect of a change in each explanatory variable on the probability to select each option. There are, however, several drawbacks. The most important is that the multinomial logit model requires the assumption of independence of irrelevant alternatives (IIA) (Maddala, 1983). This assumption states that the odds ratios derived from the model remain the same, irrespective of the number of choices

[7] As Grootaert and Kanbur (1995) discuss, the sole decision maker can be the head of household, or there can be an intra-household bargaining process, e.g. between the father and the mother-child nexus. This is not immediately relevant for the model formulation in this paper, because each type of decision making process can consider the child's options simultaneously or sequentially.

offered. In practice, the IIA assumption is inappropriate in many applications. In the case of child labor, it requires that, e.g., the choices between wage work and work at a home enterprise are seen by the decision maker as independent from other options, and not affected by whether or not a schooling option is available. Obviously, this is a very unlikely situation. If non-independent choices are included in the multinomial logit model, the model will overestimate the selection probability for those options. An attractive alternative is the multinomial probit model, in which the residuals have a multivariate normal distribution, and which is not subject to the IIA assumption. The problem here is that, for computational reasons, the model can only handle a small number of alternatives (in practice, at most four).

The multinomial probit and logit models also share the requirement that the relevant set of explanatory variables is the same for all choices. In the case of the child labor options, this is to some degree defensible, but not entirely. E.g. the cost of schooling is clearly a relevant variable in the schooling-work choice, but not for the choice among work options. Likewise, ownership of a farm may matter for the choice between work for wages and work at a home enterprise, but not for the other options.

The sequential model approach solves many of these difficulties. The IIA assumption is not required, since each alternative is introduced one at the time, and the vector of explanatory variables, if needed, can be adjusted for each set of

alternatives. Furthermore, the use of a set of binomial choice equations makes it convenient to extend the model estimation to include a labor supply equation (with hours supplied as the dependent variable). This equation is censored and needs to be corrected for possible selection bias, which can readily be done with Heckman's well-known two-step procedure (whereby the first step is the binary choice equation). The drawbacks of the sequential model are that multiple equations need to be estimated and, more importantly, that the probabilities derived from the model are conditional upon previous choices. This means that estimation results will depend upon the ordering of options. The sequential approach is thus most indicated for applications where a clear ordering of options is possible.

On balance, in the case of the child labor choices, we think that the benefits of the sequential approach outweigh the drawbacks. This is particularly so because we would argue that it is possible to determine the "proper" hierarchy of choices, namely: (1) schooling, (2) wage work, (3) home enterprise work, (4) no work. The criteria underlying this ranking are, first, the welfare of the child, and, second, the income contribution to the household. We expect little dispute with the proposition that schooling is the preferred option from the point of view of the child's welfare. If that option is not chosen, wage labor on

average will yield more income to the household than labor in a home enterprise.[8]

The discussion below will hence analyze the supply of child labor as a sequential decision making process, using three binary probit models. The appendix to this paper presents, for comparative purposes, the results of a multinomial logit model.[9]

The hierarchy of the four choices outlined above needs some modification in the case of Côte d'Ivoire, for two reasons. First, fewer than 2% of children work for wages. There are hence too few cases in the sample to permit model estimation with wage work as a separate choice. Second, almost one-third of children in Côte d'Ivoire combine work and school (Table 8). This calls for considering this combination as a separate choice category. This leads to the following four choices, and choice probabilities, to be estimated for each child:

P_1 = probability to go to school and not to work.

P_2 = probability to go to school and to work.

---

[8] The use of an income criterion must be evaluated within specific social and cultural settings. E.g., in some countries, work at home would be preferred to wage work for young women because of religious considerations. In the case of Côte d'Ivoire, our assessment is that income is a valid criterion.

[9] Either one of these models represents an improvement over the most common approach in the empirical literature, which is to use a single binary probit or logit model for the work or school choice (see, e.g., Jensen and Nielsen, 1997; Patrinos and Psacharopoulos, 1995, 1997; Mason and Khandker, 1997). Canagarajah and Coulombe (1997) use a bivariate probit model allowing for interdependency between the work and school choice.

P_3 = probability not to go to school and to work.

P_4 = probability not to go to school and not to work.

In the sequential probit model, these probabilities are determined as follows:

$$P_1 = F(b'_1 X)$$

$$P_2 = [1 - F(b'_1 X)]\, F(b'_2 X)$$

$$P_3 = [1 - F(b'_1 X)]\, [1 - F(b'_2 X)]\, F(b'_3 X)$$

$$P_4 = [1 - F(b'_1 X)]\, [1 - F(b'_2 X)]\, [1 - F(b'_3 X)]$$

where F represents the standard normal distribution function, and b_1, b_2, and b_3 are vectors of the model parameters. The vector X contains the explanatory variables. Parameters b_1 are estimated over the entire sample. Parameters b_2 are estimated over the sample of children excluding those who go to school only. Parameters b_3 are estimated over the sample of children who do not go to school. The pyramid in Figure 2 summarizes this process, and shows the sample sizes involved.

Figure 2: Samples for Sequential Probit Estimation

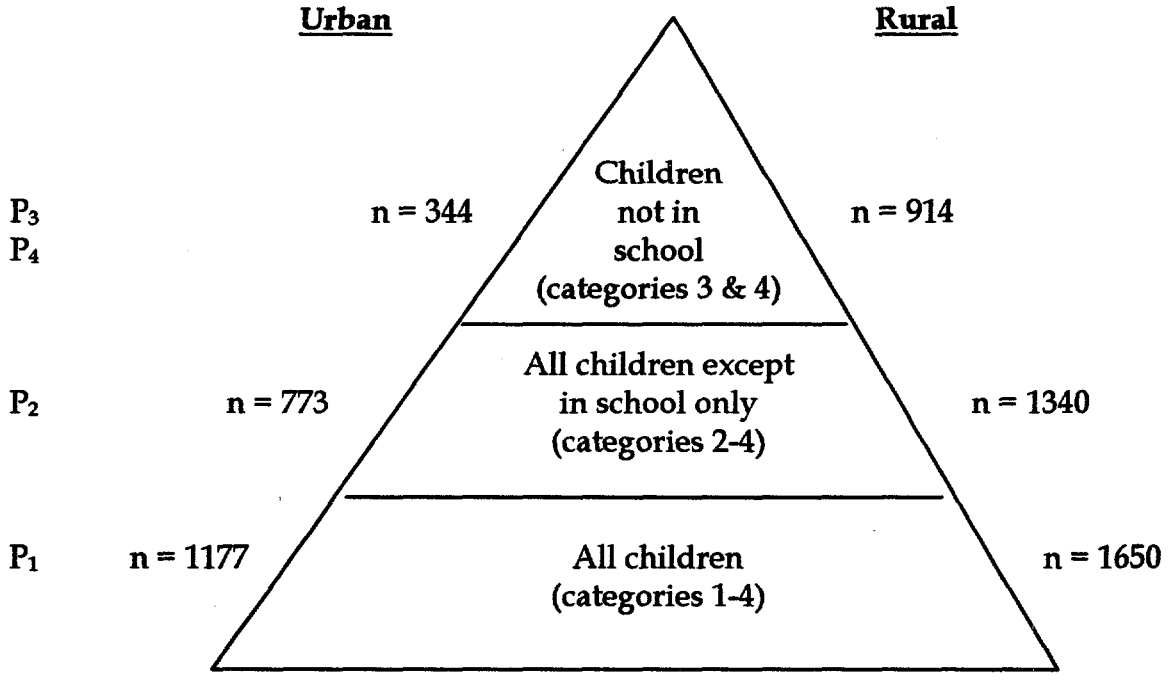


Table 11: List of Variables	
Child Characteristics	
AGE	– age of child
AGESQ	– age of child squared
FEMALE	– gender (female = 1)
Parent Characteristics	
EDUCFA	– years of education of father
EDUCFA X FEMALE	– years of education of father X gender of child
EDUCMO	– years of education of mother
EDUCMO X FEMALE	– years of education of mother X gender of child
EMPFA	– father employed
EMPFA X FEMALE	– father employed X gender of child
EMPMO	– mother employed
EMPMO X FEMALE	– mother employed X gender of child
Household Characteristics	
HEADAGE	– age of head
HEADAGESQ	– age of head squared
HEADFEMALE	– gender of head (female = 1)
#BOYS 0-5	– # of other boys in household 0-5 years
#BOYS 6-9	– # of other boys in household 6-9 years
#BOYS 10-15	– # of other boys in household 10-15 years
#BOYS 16-17	– # of other boys in household 16-17 years
#GIRLS 0-5	– # of other girls 0-5 years
#GIRLS 6-9	– # of other girls 6-9 years
#GIRLS 10-15	– # of other girls 10-15 years
#GIRLS 16-17	– # of other girls 16-17 years
FARM	– household owns farm
BUSINESS	– household owns non-farm enterprise
POOR	– household in poorest quintile
Cost of Schooling	
COST	– cluster average of household education expenditure per pupil ('000 CFAF)
–	– school less than 1 km away (omitted)
DISTANCE 1-5	– school 1-5 km away
DISTANCE 5+	– school >5 km away
Location (urban)	
–	– Abidjan (omitted)
OTHERCITIES	– other cities
Location (rural)	
–	– East Forest (omitted)
WFOREST	– West Forest
SAVANNAH	– Savannah

Results for Urban Areas

Table 12 shows the sequential probit results for urban areas, for all children ages 7-17.[10] The first two columns of the table contain the probit coefficients and their standard error (an asterisk indicates that the coefficient is significantly different from zero at the 90% confidence level). The third column shows the partial derivatives of the estimates, computed at the means of the explanatory variables. They show the change in probability, expressed in percentage points, due to a one-unit increase at the mean of a given explanatory variable, while holding all other variables constant at the mean.

The first stage results show the determinants of the probability to go to school and not to work. The first striking finding is that this probability is not influenced by the child's age. This is surprising given the U-shaped pattern of labor force participation which we observed in Figure 1, but obviously these differences are not statistically significant and/or are explained away by the other factors in the equation. Girls, however, have a 30 percentage points lower probability of going to school and not working than boys, ceteris paribus.

[10] We attempted to estimate the model separately for children in the age groups 7-14 and 15-17, in view of the higher labor force participation rates for the latter group. The small sample size however created difficulties and not all steps could be estimated successfully. The results we did obtain did not suggest any major differences between the two age groups, in terms of the key determinants of child labor. We mention the few noteworthy differences in the text.

The characteristics of the household have an important influence. Among the parent characteristics, the father's education and the mother's employment have the greatest impact, and in both cases they contribute to increasing a child's probability of going to school and not working. The interaction variables with the child's gender are not significant. One interesting finding of the regression estimated for younger children only (7-14 years) is that for girls the effect of the mother's education is twice as strong as in the regression for the whole sample.

Stage in the life cycle also matters: the older the head of the household, the more likely it is that a child will be attending school and not working—the peak of the function occurs at age 53. The gender of the head of the household is insignificant. If the household owns a non-farm business, the child has a 10 percentage points lower probability of going to school and not working. The presence of other siblings has a fairly small effect: the presence of brothers or sisters in the 10-15 age group matters most, but only increases the probability of going to school and not working by 3-4 percentage points.

Since age, education, employment and assets are the main determinants of income, our results suggest that income is a key determinant of child labor. Over and above these effects though, the dummy variable for lowest income quintile suggests that the constraints faced by the poorest further decrease the probability of attending school and not working by 8.6 percentage points.

Lastly, none of the cost-of-schooling variables were significant. We think that this result reflects the weakness of the available cost measures.

The second estimation stage eliminates from the sample the children who go to school and do not work. The probability to be determined is that of combining schooling and work. Unlike in the first stage, the child's age matters a lot: the probability of both working and going to school increases between the ages 7 and 11 and declines thereafter. Girls are less likely than boys to combine school and work and more likely to drop out of school.

Parents' education also matters more at this stage: each additional year of education of the father reduces the probability that a child will drop out of school and work by 1.8 percentage points, and each year of education of the mother does so by 3.5 percentage points. This effect is not specific to the gender of the child.

As in the previous stage, there is a pronounced life cycle effect: the older the head (up to age 57), the more likely children will attempt to combine school and work rather than drop out. Also as before, the gender of the head has no additional influence on this outcome. The role played by siblings is different at this stage: the presence of brothers at the ages 6-9 and 16-17 increases the odds of being able to combine school and work; sisters in the 11-15 age group have a similar effect.

The presence of a non-farm household enterprise reduces the probability that a child can combine work with school. In Côte d'Ivoire the ownership of such enterprises, which for the most part are in the informal sector, is associated with lower income and higher poverty (Grootaert, 1996). In contrast, wage employment is associated with higher incomes. Poverty status has an additional effect of increasing the likelihood of selecting non-schooling options. This effect shows up stronger when the regression is limited to younger children.

Lastly, the cost-of-schooling variables are again not significant. On the demand side, there is a location effect: all other things being the same, children in cities other than Abidjan are 10 percentage points more likely to combine school and work.

The third stage of the estimation looks only at the children who are not in school and determines the probability that they will work for wages or in household enterprises as opposed to doing only home care tasks or no work at all. The pattern of determinants is entirely different at this stage. The age of the child is one of the most powerful factors: the older the children, the more likely that they will work for wages or in a household's enterprise—each year increases this probability by 9 percentage points. Girls have a higher probability of being engaged only in home care tasks or not working.

Interestingly, the only parental characteristic that has a significant effect at this stage is mother's employment, which increases the odds that girls will work. This is perhaps a surprising result, given that it is sometimes argued that mothers and daughters are substitutes: if the mother works, the daughters need to take over the care of the home. This does not appear to be the case in Côte d'Ivoire. However, since most women's work in urban Côte d'Ivoire is in household enterprises, the meaning of this result is that mothers involve their daughters in this enterprise—and, likewise, they share the home care responsibilities.

Life cycle, gender of the head, and the presence of siblings have no statistically significant effects at this stage (except for sisters in the 5-9 age range). Poverty status also has no effect on the work choice at this stage. In contrast, the presence of a household farm or non-farm enterprise has a strong positive influence on the likelihood to work.

The children who work and do not go to school can rightfully be labeled "full-time workers" since their mean working hours are 44 hours per week. In order to see whether the actual supply of hours is a function of the characteristics of the child and the parent, we estimated a labor supply equation, suitably corrected for selection bias using the two-step Heckman method. We imposed two (somewhat arbitrary) identifying restrictions on the equations by deleting from the first step (the probit choice equation) the education characteristics of the

parents and from the second step (the hours-supplied equation) the head-of-household characteristics. The estimated coefficient of the hours equation are reported in the last column of the third-stage results in Table 12.

The strongest determinants of supplied hours of child labor are the age of the child and location. Hours rise sharply after age 12. Working children in other cities work an average of 20 hours per week more than working children in Abidjan.

Considering the other variables, mother's education tends to reduce the labor supply of boys but increase that of girls. This suggests again that in Côte d'Ivoire the labor supply of mothers and daughters is complementary rather than being substitutes for one another. While children in urban households who own a farm are more likely to work, the negative coefficient on the farm variable indicates that they work on average fewer hours. Children from the poorest households also work less on average. This finding is different from the tabular results presented earlier, which showed that children from poor households worked more hours. The multivariate result in Table 12 is of course a partial result, after controlling for all other relevant variables, and suggests that the poorest households face constraints that affect negatively their ability to supply labor. The observed higher labor supply results from above average presence in poor households of factors which tend to increase child labor supply—the most important one being location, since the poverty rate in other cities is much

higher than in Abidjan. Lastly, as an econometric point, we note that the hours equation is not subject to selection bias, since the coefficient of "lambda" (the inverse Mills-ratio) is not significantly different from zero.

Summary. In urban areas in Côte d'Ivoire, the decision to supply child labor is influenced significantly by the age and gender of the child, and by the characteristics of the parents and the household in general. A very pronounced gender gap exists at all three decision stages: girls are less likely to only attend school or to combine work and school, and they are more likely to undertake home care activities or not work. The continued promotion of girls' schooling through appropriate incentives must thus remain a priority in Côte d'Ivoire. Every additional year of age above 11, greatly increases the odds that the child works. Parents' own education, the presence of a non-farm business in the household, and the constraints from being among the poorest households are the most important variables in determining the child work/schooling outcome in Côte d'Ivoire.

Parents' characteristics, especially education, matter the most at the first two decision stages relating to schooling options. Parents with no or low education are more likely to choose work options for their children. This effect is particularly strong for younger children. This underlines the transgenerational aspect of lack of schooling and child labor. The effect is also accentuated with younger parents. While parental education is in itself not a

policy variable, low parental education could be used as a targeting variable for interventions.

The results also underline the importance of a gradual policy approach towards the elimination of child labor. More than one in three urban children in Côte d'Ivoire combine work and school. It would be a big step forward if children who currently only work or are engaged in home care tasks could be induced to combine this with school attendance. Flexibility in school hours is an important policy variable in this context. This would have benefits for the children beyond education, and also improve their health status. Children who work report a much higher rate of illness and injury and a lower rate of consultation with a health care professional than children who combine work and schooling.

The employment situation of the parents and the sources of income of the household are a double-edged knife as far as child labor is concerned. An employed mother will contribute to household income, thus reducing the need for child labor and leading to much higher probabilities that the child will go to school. However, in Côte d'Ivoire, the bulk of urban female employment is in household enterprises, and the presence of these (all other things being the same) increases the odds of child labor. The results of the third stage estimation moreover show that mothers and daughters are not substitutes in employment, but complement each others' work, both in the household enterprise and in

home care. Ownership of a household enterprise is a positive correlate of poverty in Côte d'Ivoire, and among the poorest households child labor is more likely. Care will thus have to be exercised that poverty alleviation policies which include the provision of credit and other forms of support to household enterprises do not have the inadvertent effect of increasing child labor.

The solution to this dilemma is the joint provision of support measures to increase household income of the poor and incentives towards school attendance. As an interim measure, facilitating the work/school combination (e.g. with flexible school hours) may well be needed. Unfortunately, due to data limitations, our results are weak in suggesting the nature of schooling incentives. Neither the cost nor distance variables yielded significant coefficients. Still, one should not conclude that cost of schooling is not a suitable policy variable. More analysis with better cost data is needed. What we can say though, is that targeting towards girls, towards children above age 11 (when drop-out probabilities begin to increase) and towards children in the poorest households and with the youngest parents is called for.

Table 12: Sequential Probit Results—Urban Areas

First Stage: P_1 = Probability of going to school and not working

	Probit Coefficient	Standard Error	Probability Derivative (% points)
Intercept	-0.5812	0.9413	–
Child Characteristics			
AGE	-0.1566	0.1224	-5.45
AGESQ	-0.0010	0.0053	-0.03
FEMALE	-0.8563*	0.2131	-29.80*
Parent Characteristics			
EDUCFA	0.0424*	0.0152	1.48*
EDUCFA X FEMALE	-0.0065	0.0224	-0.23
EDUCMO	-0.0232	0.0178	-0.81
EDUCMO X FEMALE	0.0313	0.0250	1.09
EMPFA	-0.1140	0.1579	-3.97
EMPFA X FEMALE	0.0612	0.1999	2.13
EMPMO	0.3055*	0.1324	10.63*
EMPMO X FEMALE	-0.2677	0.1744	-9.32
Household Characteristics			
HEADAGE	0.0837*	0.0266	2.91*
HEADAGESQ	-0.0008*	0.0003	-0.03*
HEADFEMALE	0.1214	0.1767	4.22
#BOYS 0-5	-0.0631	0.0460	-2.20
#BOYS 6-9	0.0544	0.0609	1.89
#BOYS 10-15	0.1049*	0.0650	3.65*
#BOYS 16-17	0.1058	0.1370	3.68
#GIRLS 0-5	-0.0090	0.0458	-0.31
#GIRLS 6-9	0.0598	0.0602	2.08
#GIRLS 10-15	0.1262*	0.0652	4.39*
#GIRLS 16-17	0.1213	0.1385	4.22
FARM	-0.2151	0.1412	-7.48
BUSINESS	-0.2885*	0.1154	-10.04*
POOR	-0.2480*	0.1123	-8.63*
Cost of Schooling			
COST	0.0031	0.0024	0.11
DISTANCE 1-5	0.0939	0.1005	3.27
DISTANCE 5+	0.2547	0.1630	8.86
Location			
OTHERCITIES	0.1116	0.1160	3.88
Log. Likelihood	-603.9		
Restricted Log. Likelihood	-795.6		
Chi-Squared	383.4*		
% Correct Predictions	72.5		

Table 12: Sequential Probit Results—Urban Areas

Second Stage: P_2 = Probability of combining work and school

	Probit Coefficient	Standard Error	Probability Derivative (% points)
Intercept	-4.700*	1.1033	–
Child Characteristics			
AGE	0.5357*	0.1368	21.05*
AGESQ	-0.0251*	0.0056	-0.99*
FEMALE	-0.4174*	0.2461	-16.40*
Parent Characteristics			
EDUCFA	0.0468*	0.0210	1.84*
EDUCFA X FEMALE	-0.0247	0.0252	-0.97
EDUCMO	0.0901*	0.0285	3.54*
EDUCMO X FEMALE	-0.0534	0.0342	-2.10
EMPFA	0.0143	0.2112	0.56
EMPFA X FEMALE	0.3461	0.2381	13.60
EMPMO	0.1838	0.1861	7.22
EMPMO X FEMALE	0.0302	0.2116	1.18
Household Characteristics			
HEADAGE	0.0696*	0.0309	2.73*
HEADAGESQ	-0.0006*	0.0003	-0.02*
HEADFEMALE	0.1037	0.1947	4.07
#BOYS 0-5	-0.0217	0.0504	-0.85
#BOYS 6-9	0.1171*	0.0717	4.60*
#BOYS 10-15	-0.0217	0.0803	-0.85
#BOYS 16-17	0.3546*	0.1835	13.93*
#GIRLS 0-5	0.0122	0.0499	0.48
#GIRLS 6-9	-0.0004	0.0681	-0.02
#GIRLS 10-15	0.2296*	0.0825	9.02*
#GIRLS 16-17	0.0719	0.1800	2.82
FARM	-0.1936	0.1547	-7.60
BUSINESS	-0.3213*	0.1298	-12.62*
POOR	-0.3184*	0.1248	-12.51*
Cost of Schooling			
COST	0.0027	0.0032	0.11
DISTANCE 1-5	0.0809	0.1153	3.18
DISTANCE 5+	0.2373	0.1867	9.32
Location			
OTHERCITIES	0.2686*	0.1375	10.55*
Log. Likelihood	-457.8		
Restricted Log. Likelihood	-494.3		
Chi-Squared	73.1*		
% Correct Predictions	66.3		

Table 12: Sequential Probit Results – Urban Areas

Third Stage: P_3 = Probability of only working

	Probit Coefficient	Standard Error	Probability Derivative (% points)	Weekly Hours Worked (OLS) Coefficient)
Intercept	-4.6326*	2.2369	–	115.6*
Child Characteristics				
AGE	0.5139*	0.3006	9.33*	-11.23*
AGESQ	-0.0127	0.0118	-0.23	0.46*
FEMALE	-0.8580*	0.4909	-15.58*	-5.97
Parent Characteristics				
EDUCFA	0.0172	0.0429	0.31	0.14
EDUCFA X FEMALE	-0.0707	0.0525	-1.28	-1.00
EDUCMO	-0.1394	0.1033	-2.53	-6.96*
EDUCMO X FEMALE	0.0582	0.1147	1.06	8.32*
EMPFA	-0.1283	0.4114	-2.33	2.40
EMPFA X FEMALE	0.2419	0.4570	4.39	4.00
EMPMO	-0.3016	0.3592	-5.48	3.96
EMPMO X FEMALE	1.0052*	0.4280	18.25*	-3.26
Household Characteristics				
HEADAGE	-0.0169	0.0534	-0.31	–
HEADAGESQ	-0.0001	0.0005	-0.00	–
HEADFEMALE	0.2242	0.3583	4.07	–
#BOYS 0-5	-0.1546	0.1057	-2.81	1.85
#BOYS 6-9	-0.1147	0.1455	-2.08	1.41
#BOYS 10-15	0.0916	0.1539	1.66	0.07
#BOYS 16-17	-0.5927	0.5748	-10.76	1.24
#GIRLS 0-5	-0.0890	0.0859	-1.61	-2.38
#GIRLS 6-9	0.3486*	0.1382	6.33*	-2.91
#GIRLS 10-15	0.1842	0.1594	3.34	-0.42
#GIRLS 16-17	-0.2081	0.4008	-3.78	-12.99
FARM	1.6093*	0.2907	29.22*	-22.51*
BUSINESS	0.5075*	0.2653	9.22*	-1.18
POOR	0.0927	0.2271	1.68	-13.43*
Cost of Schooling				
COST	–	–	–	–
DISTANCE 1-5	–	–	–	–
DISTANCE 5+	–	–	–	–
Location				
OTHERCITIES	0.2917	0.2691	5.30	20.08*
Lambda				-1.76
Log. Likelihood	-116.3			
Restricted Log. Likelihood	-202.8			
Chi-Squared	172.9*			
% Correct Predictions	84.5			
R-Squared	–	–	–	0.49

Results for Rural Areas

The first stage estimation results for rural areas (Table 13) suggest that, as was the case in urban areas, the age of the child is not a significant determinant of the probability of only going to school. Gender is, however, a powerful determinant: girls in rural areas are 15 percentage points less likely to only be in school than boys, after controlling for other relevant variables (in urban areas, this differential was 30 percentage points).

Parents' education matters more in rural areas than in urban areas. However, while the father's education increases the probability that girls attend school and do not work, the mother's education decreases it. Parents' employment status has no further significant effect on this.

The role of the characteristics of the head of household are the reverse of what we found in urban areas. In rural areas, there is no life cycle effect on the supply of child labor, but a female head of household significantly decreases the odds of a child going to school and not working. In urban areas, we found no gender effect, but a strong age effect.

The presence of siblings seems to matter less than in urban areas. Likewise, the ownership of a non-farm business or the household's poverty status has no an independent effect on the child labor decision.

Among the cost-of-schooling variables, only the dummy variable indicating a distance in excess of 5 km has a significant coefficient. Its positive sign, however, is wrong from a theoretical perspective: one would expect distance to be a hindrance to school attendance. It is likely that we are estimating a reverse causality, whereby attending a far-away school makes it difficult to work at the same time.

While we found no strong differences between Abidjan and the other cities in Côte d'Ivoire, in rural areas there is a pronounced regional effect. All other things equal, children in West Forest are 4 percentage points less likely to go to school and not to work than in the reference region of East Forest, and those in Savannah are 19 percentage points less likely to do so.

In the second estimation stage, the determinants of the probability to combine work and school display an overall pattern similar to what was observed for urban areas. The probability of combining work and school rises with the child's age until age 11, after which point it becomes more likely that the child drops out of school.

Parents' education again exerts a powerful influence on this outcome. The more educated the parents, the more likely a child will combine education with work—but this effect is markedly lower for girls. Older heads of household (up to age 56) are also more likely to decide in favor of the work-school combination.

As far as siblings is concerned, the key age group appears to be 10-15 years. Having brothers or sisters in that age group greatly reduces the odds of school drop-out and increases that of maintaining the work-school combination. The large negative coefficient for "number of boys 16-17" is out of line with all others; given that only 3% of the children in the sample have these siblings, we suspect that this result is unduly influenced by a few (unusual) observations in the sample.

As we found in urban areas, the second decision stage is the one where household assets and poverty status matter the most. The presence of a non-farm business decreases the probability of a combined work-school outcome by 9 percentage points,[11] and being among the poorest 20% of households further lowers it by 27 percentage points.

[11] In the rural equations, there is no variable for the ownership of a farm because almost all rural households own a farm.

In rural areas, distance to the school also matters. If the school is 1-5 kms. away, rather than being in the village, it reduces the probability that the child can combine work and school by 18 percentage points.

Location effects are again very pronounced. In West Forest, a child is 14 percentage points more likely to be able to combine work and school relative to East Forest, but in Savannah this outcome is 11 percentage points less likely. This result probably reflects the poor educational infrastructure in Savannah.

The third and final stage models the choice between work for wages (rare in rural areas) or in the household farm or enterprise versus undertaking home care tasks only or not working. This outcome is quite strongly related to the age of the child, with younger children being more likely to be assigned home care tasks or not working. In urban areas we found that girls are much more likely to receive home care assignments or not to work, but in rural areas this gender effect is absent.

Again, as we observed in urban areas, in the third decision stage, parents' education ceases to be a significant determinant, but employment status remains significant. Although not all coefficients are significantly different from zero, the results suggest that an employed father increased the odds that a son will also be employed and a daughter be assigned to home care, while an employed mother has the reverse effect. This finding again undercuts the hypothesis that mothers

and daughters are substitutes for one another when it comes to home care, and rather suggests that mother's employment leads to a situation whereby both work and home care duties are shared.

The presence of siblings has little impact at the third decision stage, but the presence of a non-farm enterprise does. Strangely enough, the direction of the effect is opposite from that in urban areas. In cities, the presence of a home enterprise increases the odds of a child's work in this enterprise, but in rural areas it decreases these odds. There are two reasons for this result. First, almost all rural households have a farm, and this makes a far greater claim on child labor. (The farm variable, of course, is not in the rural equation because there is no variation across households). Second, home enterprises in rural areas are mostly a subordinate activity and can more easily be combined with home care.

Lastly, the strong regional diversification continues to manifest itself, with children in Savannah being much more likely to work on the farm or the home enterprise.

As we did for urban areas, we also estimated an hours worked equation suitably corrected for selection bias. The average hours worked by children who work on the farm or in a household enterprise is 34.8 hours per week.

The results from this equation (Table 12, third stage, column 4) are not very illuminating. The equation has a fairly poor fit ($R^2 = 0.16$) and the main finding is that children in Savannah work on average 9 hours longer than elsewhere. This is in addition to their already higher probability to work. The selection variable lambda has a large positive coefficient, indicating that any unobserved variables which make selection into child work more likely also contribute to increasing work hours above average. This result underlines the double disadvantage faced by children in Savannah and the need to make intervention in this region a top policy priority.

Summary. The results from the rural sequential probit model identify several key characteristics of the household which affect the child labor decision, but the overriding finding (and major difference with the results for urban areas) is the strong location effect. All other factors being the same, children in the Savannah have a far lower probability to go to school or to combine work and school than children elsewhere. This reflects the thin educational infrastructure in Savannah—a disadvantage that has been present for several generations as reflected e.g. in literacy rates in that region which are less than one-third the national average (Grootaert, 1993). The prerequisite for any successful child labor policy in rural Côte d'Ivoire is therefore to reduce the gap in education investment between Savannah and the rest of the country.

Girls in rural Côte d'Ivoire are less likely to be given options involving schooling than boys, but the gender gap is less than in urban areas (primarily because more children work overall in rural areas). Unlike in urban areas, a female head of household increases the chances that a child will work. Parents' education is an even more critical variable in rural than in urban areas, because it is a more rare attribute.

Poverty status of the household matters the most in the decision between work-only and the work-school combination. This underlines the usefulness of the gradual policy approach towards child labor whereby initially interventions aim to make possible the combination of work and schooling, rather than to eliminate immediately all child work. In the short run, having no children work is not a viable strategy for many poor households. In the rural setting, flexibility of school hours and vacation periods that coincide with harvest times are two potentially effective measures to allow children to stay in school while helping on the household farm.

The rural results identify the importance of having a school in the village as opposed to 1-5 kms. away. The multinomial logit results, discussed in the appendix, suggest that cost of schooling also matters in rural areas (at a hefty rate of a one percentage point reduction in the probability to work for every $3 reduction in schooling cost). However, the same caveat regarding data quality

applies as for urban areas, and better cost data would have to confirm this finding before it could be used to support concrete interventions.

Lastly, the rural results suggest that measures need be targeted to children above age 11, at which point the probability to drop out of school begins to rise. To this needs to be added of course the targeting towards girls and towards all children in the Savannah region.

Table 13: Sequential Probit Results—Rural Areas

First Stage: P_1 = Probability of going to school and not working

	Probit Coefficient	Standard Error	Probability Derivative (% points)
Intercept	0.0471	0.9192	--
Child Characteristics			
AGE	0.0130	0.1296	0.26
AGESQ	-0.0075	0.0058	-0.15
FEMALE	-0.7652*	0.2483	-15.17*
Parent Characteristics			
EDUCFA	0.0279	0.0192	0.55
EDUCFA X FEMALE	0.0608*	0.0305	1.21*
EDUCMO	0.0609*	0.0331	1.21*
EDUCMO X FEMALE	-0.2256*	0.0720	-4.47*
EMPFA	-0.1217	0.1485	-2.41
EMPFA X FEMALE	-0.0504	0.2512	-1.00
EMPMO	-0.0685	0.1109	-1.36
EMPMO X FEMALE	-0.1198	0.1884	-2.38
Household Characteristics			
HEADAGE	0.0081	0.0236	0.16
HEADAGESQ	0.0000	0.0002	0.00
HEADFEMALE	-0.5347*	0.2216	-10.60*
#BOYS 0-5	0.0188	0.0422	0.37
#BOYS 6-9	0.0588	0.0604	1.17
#BOYS 10-15	0.1141*	0.0652	2.26*
#BOYS 16-17	-0.0301	0.2682	-0.60
#GIRLS 0-5	0.0043	0.0404	0.08
#GIRLS 6-9	0.0857	0.0675	1.70
#GIRLS 10-15	0.1117	0.0755	2.21
#GIRLS 16-17	-0.0850	0.2261	-1.69
BUSINESS	0.2304	0.1496	4.57
POOR	-0.1452	0.1064	-2.88
Cost of Schooling			
COST	-0.0086	0.0073	-0.17
DISTANCE 1-5	-0.1851	0.1203	-3.67
DISTANCE 5+	0.2888*	0.1161	5.73*
Location			
WFOREST	-0.2015*	0.1028	-4.00*
SAVANNAH	-0.9786*	0.1229	-19.40*
Log. Likelihood	-622.2		
Restricted Log. Likelihood	-743.5		
Chi-Squared	242.5*		
% Correct Predictions	82.1		

Table 13: Sequential Probit Results – Rural Areas

Second Stage: P_2 = Probability of combining work and school

	Probit Coefficient	Standard Error	Probability Derivative (% points)
Intercept	-8.7698*	1.0688	–
Child Characteristics			
AGE	1.1550*	0.1346	37.22*
AGESQ	-0.0534*	0.0059	-1.72*
FEMALE	-0.2139	0.2256	-6.89
Parent Characteristics			
EDUCFA	0.2061*	0.0290	6.64*
EDUCFA X FEMALE	-0.1221*	0.0353	-3.93*
EDUCMO	0.0986*	0.0567	3.18*
EDUCMO X FEMALE	-0.0300	0.0707	-0.97
EMPFA	-0.1525	0.1750	-4.91
EMPFA X FEMALE	0.0343	0.2253	1.10
EMPMO	-0.1269	0.1306	-4.09
EMPMO X FEMALE	0.0214	0.1728	0.69
Household Characteristics			
HEADAGE	0.1118*	0.0284	3.60*
HEADAGESQ	-0.0010*	0.0003	-0.03*
HEADFEMALE	-0.1096	0.2105	-3.53
#BOYS 0-5	-0.0023	0.0442	-0.07
#BOYS 6-9	-0.0318	0.0618	-1.02
#BOYS 10-15	0.1854*	0.0670	5.97*
#BOYS 16-17	-0.6486*	0.3041	-20.90*
#GIRLS 0-5	0.0244	0.0407	0.78
#GIRLS 6-9	0.0131	0.0696	0.42
#GIRLS 10-15	0.1958*	0.0838	6.31*
#GIRLS 16-17	0.0679	0.1804	2.19
BUSINESS	-0.2827*	0.1607	-9.11*
POOR	-0.8245*	0.1095	-26.57*
Cost of Schooling			
COST	-0.0066	0.0079	-0.21
DISTANCE 1-5	-0.5504*	0.1265	-17.74*
DISTANCE 5+	-0.1124	0.1240	-3.62
Location			
WFOREST	0.4454*	0.1103	14.35*
SAVANNAH	-0.3374*	0.1169	-10.87*
Log. Likelihood	-603.8		
Restricted Log. Likelihood	-796.1		
Chi-Squared	384.7*		
% Correct Predictions	76.8		

Table 13: Sequential Probit Results—Rural Areas

Third Stage: P_3 = Probability of only working	Probit Coefficient	Standard Error	Probability Derivative (% points)	Weekly Hours Worked (OLS Coefficient)
Intercept	-5.7076*	1.1132	–	-5.41
Child Characteristics				
AGE	0.8039*	0.1423	29.46*	3.44
AGESQ	-0.0244*	0.0061	-0.89*	-0.10
FEMALE	-0.0813	0.2557	-2.98	-4.89
Parent Characteristics				
EDUCFA	-0.0713	0.0555	-2.61	1.27*
EDUCFA X FEMALE	0.0232	0.0632	0.85	-0.75
EDUCMO	0.0513	0.0905	1.88	0.53
EDUCMO X FEMALE	-0.0784	0.1088	-2.87	-1.07
EMPFA	0.5257*	0.2104	19.26*	2.97
EMPFA X FEMALE	-0.3631	0.2587	-13.30	1.14
EMPMO	0.1557	0.1586	5.71	0.92
EMPMO X FEMALE	0.3606*	0.2051	13.21*	0.46
Household Characteristics				
HEADAGE	-0.0146	0.0306	-0.53	–
HEADAGESQ	0.0001	0.0003	0.01	–
HEADFEMALE	-0.0498	0.2446	-1.82	–
#BOYS 0-5	0.0631	0.0514	2.31	1.36*
#BOYS 6-9	0.3327*	0.0833	11.82*	1.11
#BOYS 10-15	-0.0051	0.0878	-0.19	-1.22
#BOYS 16-17	-0.0037	0.2736	-0.13	-1.22
#GIRLS 0-5	-0.0505	0.0510	-1.85	0.48
#GIRLS 6-9	0.0740	0.0849	2.71	0.02
#GIRLS 10-15	-0.1393	0.1031	-5.11	2.31*
#GIRLS 16-17	-0.1625	0.2178	-5.95	1.83
BUSINESS	-0.7152*	0.1820	-26.21*	0.88
POOR	-0.0715	0.1157	-2.62	-1.96
Cost of Schooling				
COST	–	–	–	–
DISTANCE 1-5	–	–	–	–
DISTANCE 5+	–	–	–	–
Location				
WFOREST	-0.3973*	0.1531	-14.56*	0.49
SAVANNAH	0.7885*	0.1268	28.89*	9.34*
Lambda				9.92*
Log. Likelihood	-409.4			
Restricted Log. Likelihood	-628.8			
Chi-Squared	438.8*			
% Correct Predictions	80.2			
R-Squared	–	–	–	0.16

5. Conclusions

Most children in Côte d'Ivoire perform some form of work: work for wages, work on the farm or the household enterprise, or home care tasks. In urban areas, two out of every three children in the age group 7-17 years work and about half of them combine this with school attendance. In rural areas more than four out of every five children work, but only about a third of them manage to combine this with schooling. Full-time child work, which can be expected to have a major negative impact on the child's personal development, is less prevalent but not negligible. In urban areas, 7% of children work full-time, for an average of 46 hours per week. In rural areas, more than one-third of children work full-time for an average of 35 hours per week, with the highest incidence in the Savannah region. While the incidence of full-time child work rises with age, it is by no means limited to older children: the average age of the full-time child worker in Côte d'Ivoire is 12.7 years. The damage to the development of these children is made clear by the fact that they have received on average only 1.2 years of education, have a higher incidence of illness and injury, and are less likely to receive medical attention.

The figures cited pertain to 1988 and reflect a gradual increase of child labor over the decade of the 1980s which was characterized by a severe economic crisis in Côte d'Ivoire. Our results suggest that during this crisis, reduced labor

force participation of adults in poor households was compensated by an increase in the participation of younger household members. The hope is therefore that as the macroeconomic performance of the economy improves, child labor will decline. Like for so many economic and social problems, a sound macroeconomic environment which makes possible sustainable economic growth is crucial to the long-run decline of child labor. However, while such growth is a prerequisite for the elimination of child labor in Côte d'Ivoire, it should clearly not be relied on as sole instrument to address the problem. The experience of the currently developed nations during their industrial revolution suggests that it could well take several generations for economic growth to reduce child labor significantly.

In order to identify policy variables, we examined the determinants of child labor using a sequential probit model. (An alternative multinomial logit model is presented in the appendix). Our results identify five key factors which affect the household's decision to supply child labor: the age and the gender of the child, the education and employment status of the parents, the availability of within-household employment opportunities, the household's poverty status and its geographic location. Due to data limitations, our results are ambivalent about the role of schooling costs and distance to school.

At each stage of the household decision making process, a pronounced gender gap is observed, especially in urban areas: girls are less likely to attend

school exclusively, they are less likely to combine work and school relative to working only, and they are more likely to undertake home care tasks. In rural areas, a female head of household further increases the odds that a child will have to work. The continued promotion of girls' schooling through appropriate incentives must thus remain a priority in Côte d'Ivoire. Efforts to increase school attendance of children (girls and boys) need to pay special attention to children who have reached age 11, because from that age on the probability to work increases rapidly, i.e. well before children finish elementary school (which in Côte d'Ivoire occurs at age 14 on average).

Parent's characteristics, especially education, matter the most at the decision stages involving schooling options. Parents with no or low education are more likely to choose work options for their children. This effect is most pronounced in rural areas and for younger children, and underlines the transgenerational aspect of lack of schooling and child labor. While parental education in itself is not a short-term policy variable, low parental education can be used as a targeting variable for interventions.

The presence of household enterprises as an in-house source of employment for children is a double-edged sword. On the one hand, the direct effect is to increase greatly the odds of a child working, but the increased income of the enterprise reduces the odds of child labor. Since in Côte d'Ivoire, ownership of a household enterprise is a positive correlate of poverty, the direct

effect is likely to outweigh the income effect. Furthermore, our results indicate that if the mother is the entrepreneur running the household enterprise, the chances that daughters get drawn into the enterprise as well are high. There is thus a danger that poverty alleviation policies which include the provision of credit and other forms of support to household enterprises may, initially at least, have the inadvertent effect of increasing child labor. The solution is the joint provision of support measures to increase household income of the poor and incentives towards school attendance.

The role played by household enterprises, as well as the finding that the poverty status of the household matters the most in the decision between the work-only option and the work-school combination, underline the usefulness of a gradual policy approach towards child labor. Initially, interventions should aim to make possible the combination of work and schooling, rather than to eliminate immediately all child work. Flexibility of school hours and vacation periods in rural areas which coincide with harvest times are two potentially effective measures to facilitate the work-school combination. Our data suggest that this would also improve children's health status.

Measures to make schooling less costly and more accessible are likely to help as well but our results are ambivalent due to the weakness of the data on costs of schooling. For rural areas, the results indicate that school attendance can be improved by having a school in the village rather than at a distance of

1-5 kms away. The multinomial logit results show that a reduction in the cost of schooling by about $3 would lead to a one percentage point increase in the probability of school attendance, but the sequential probit model does not confirm this finding. Further analysis with better cost data is needed.

Lastly, our findings show the need for and the strong potential of geographic targeting. In urban areas, children in the interior cities of Côte d'Ivoire have a much higher probability of working and their working hours are much longer. In rural areas, children in the Savannah region are much more likely to work than elsewhere, after controlling for all relevant household characteristics. The educational infrastructure in the Savannah lags far behind the rest of the country, as it has done for generations, and the reduction of the gap in educational investment between the Savannah and the rest of the country is an important prerequisite for a successful child labor policy in Côte d'Ivoire.

Appendix: Multinomial Logit Results

As discussed in the text, the multinomial logit model provides an alternative estimation method to the sequential probit. We have argued that this model is less appropriate because of the Independence of Irrelevant Alternatives (IIA) assumption, which is not likely to hold in the case of the child labor decision.

There is no reason to expect that the sequential probit model and the multinomial logit model would yield similar results. This is because the IIA assumption is not imposed on the sequential probit model, and because the sequential probit model yields probabilities conditional upon the outcome of the previous choice whilst the multinomial logit model yields unconditional and simultaneously determined probabilities.

The multinomial logit results are shown in Table A1. Only derivatives calculated at the mean of the independent variables are shown. They are marked by an asterisk (*) if they are significantly different from zero at the 90% confidence level. Those probabilities are constrained to sum to zero for each variable, across the four choices.

The statistical fit of the multinomial logit model is good but its predictive ability, at 50-60% correct predictions, is inferior to the probit models, which

predicted correctly in the 70-80% range. The urban model severely underpredicts the work-only choice and overestimates the work/school combination. The errors in the rural model are fairly evenly spread across the four choices.

In spite of the different assumptions underlying the two models, the results in Table A1 confirm many of the major findings which we highlighted in the main text. In urban areas, both models pick up the bias for girls against schooling and towards home care. Likewise, both models confirm the role of parents' education in deciding the options involving schooling and the greater importance of the mother's employment status relative to the father's employment status. Similarly, both models confirm the role of non-farm household enterprises, and of the household's poverty status. Where the models differ is in the role of siblings and of location. The multinomial logit model shows many fewer significant coefficients for the sibling variables than the sequential probit. The multinomial logit model shows the strongest location effect in the home care/work choice, while the probit model puts this in the decision involving the work-school combination.

For rural areas, the main conclusions from the sequential probit estimation are also confirmed by the multinomial logit results. For example, both models portray the growing difficulty for older children to combine work and school and the increased likelihood as they get older to drop out of school

and work only. Both models highlight the severely disadvantaged position of children in the Savannah region.

There are two noteworthy differences between the models. First, the multinomial logit model shows a higher importance of the cost-of-schooling variables for rural areas. It is the only model which suggests that an increase in cost of schooling increases the probability to opt for work (at a rate of about one percentage point for every 1000 CFAF—about $3). Second, the probit model shows a gender gap only for the schooling decision, while the multinomial logit model shows this also for the work versus home care choice. This can be explained by the fact that in the sequential probit case the probability is conditional upon a non-schooling choice for girls, whilst in the multinomial logit case all options are considered simultaneously.

Table A1: Multinomial Logit Results (probability derivatives at the mean)

	URBAN AREAS			
	Schooling Only	Work and School	Work Only	Home Care or No Work
Child Characteristics				
AGE	-6.89	18.01*	0.55	-11.68*
AGESQ	0.02	-0.63*	0.00	0.61*
FEMALE	-29.40*	9.07	0.04	20.25*
Parent Characteristics				
EDUCFA	1.66*	0.28	-0.11	-1.83*
EDUCFA X FEMALE	-0.37	-0.56	-0.03	0.97
EDUCMO	-0.40	2.35*	-0.57	-1.38
EDUCMO X FEMALE	0.69	-1.74*	0.31	0.74
EMPFA	-4.13	2.48	0.19	1.45
EMPFA X FEMALE	1.27	7.67	-0.58	-8.36
EMPMO	12.21*	-2.40	-0.77	-9.03*
EMPMO X FEMALE	-10.98*	7.48	1.42	2.08
Household Characteristics				
HEADAGE	3.01*	-0.72	-0.25*	-2.02*
HEADAGESQ	-0.03*	0.01	0.00	0.02*
HEADFEMALE	4.39	-0.58	0.34	-4.15
#BOYS 0-5	-2.31	0.41	-0.18	2.08
#BOYS 6-9	1.61	1.50	-0.48	-2.62
#BOYS 10-15	3.76	-2.86	0.09	-0.99
#BOYS 16-17	4.44	3.67	-1.66	-6.44
#GIRLS 0-5	-0.35	-0.24	-0.20	0.79
#GIRLS 6-9	2.66	-0.80	0.38	-2.24
#GIRLS 10-15	5.55*	3.14	-0.32	-8.37*
#GIRLS 16-17	4.74	-1.33	-0.18	-3.22
FARM	-5.44	6.27	3.17*	-4.00
BUSINESS	-10.84*	1.21	1.59*	8.04*
POOR	-7.97*	-2.33	0.78	9.53*
Cost of Schooling				
COST	0.13	-0.00	-0.00	-0.00
DISTANCE 1-5	2.80	-0.55	-0.86	-1.39
DISTANCE 5+	9.54	-3.36	-1.31	-4.87
Location				
OTHERCITIES	3.78	3.80	0.10	-7.68*
Predicted Probability (%)	33.0	44.9	1.5	20.6
Actual Frequency (%)	34.1	36.5	6.8	22.6
Log. Likelihood	-1180.2			
Restricted Log. Likelihood	-1470.5			
Chi-Squared	580.6*			
% Correct Predictions	51.5			

Table A1: Multinomial Logit Results (probability derivatives at the mean)

	RURAL AREAS			
	Schooling Only	Work and School	Work Only	Home Care or No Work
Child Characteristics				
AGE	-1.31	29.49*	0.66	-28.85*
AGESQ	-0.12	-1.35*	0.34*	1.23*
FEMALE	-14.95*	-0.77	3.42	12.30*
Parent Characteristics				
EDUCFA	1.96*	5.49*	-6.17*	-1.29
EDUCFA X FEMALE	0.35	-4.15*	2.76	1.05
EDUCMO	1.96*	1.35	0.09	-3.40
EDUCMO X FEMALE	-5.49*	2.50	-1.31	4.30*
EMPFA	-2.72	-2.68	11.84*	-6.44
EMPFA X FEMALE	-3.00	1.93	-1.70	2.77
EMPMO	-1.74	-2.85	3.54	1.05
EMPMO X FEMALE	-4.05	3.23	12.44*	-11.62*
Household Characteristics				
HEADAGE	0.21	2.64*	-1.91*	-0.95
HEADAGESQ	0.00	-0.03*	0.02*	0.01
HEADFEMALE	-12.59*	3.46	5.19	3.93
#BOYS 0-5	0.71	-0.23	0.99	-1.46
#BOYS 6-9	0.80	-0.35	6.52*	-6.98*
#BOYS 10-15	3.12*	4.37*	-5.09*	-2.41
#BOYS 16-17	-2.53	-16.54*	14.37*	4.70
#GIRLS 0-5	-0.02	0.73	-1.82	1.11
#GIRLS 6-9	2.16	0.72	0.98	-3.85*
#GIRLS 10-15	3.98*	5.38*	-9.19*	-0.17
#GIRLS 16-17	-2.35	1.53	-1.27	2.09
BUSINESS	4.61	-7.68	-12.30*	15.37*
POOR	-4.14	-26.47*	16.80*	13.82*
Cost of Schooling				
COST	-0.28	-0.35	1.00*	-0.37*
DISTANCE 1-5	-4.01	-16.34*	11.76*	8.60*
DISTANCE 5+	6.57*	-2.53	-9.54*	5.50
Location				
WFOREST	-2.66	17.13*	-15.53*	1.06
SAVANNAH	-23.03*	-3.54	35.65*	-9.07*
Predicted Probability (%)	15.4	29.3	31.7	23.6
Actual Frequency (%)	18.8	25.8	34.4	20.9
Log. Likelihood	-1635.1			
Restricted Log. Likelihood	-2242.0			
Chi-Squared	1213.7*			
% Correct Predictions	57.6			

Note: Probability derivatives are expressed in percentage points; * indicates significantly different from zero at the 90% confidence level.

References

Ashagrie, K. (1993). "Statistics on Child Labor: A Brief Report." *Bulletin of Labour Statistics*, No. 3.

Canagarajah, S. and H. Coulombe. (1997). "Child Labor and Schooling in Ghana." Mimeo, Africa Technical Department, Washington, DC: The World Bank.

DeGraff, D. S., R. E. Bilsborrow, and A. N. Herrin (1993). "The Implications of High Fertility for Children's Time Use in the Philippines." Chapter in Lloyd (ed.), 1993.

Demery, L. (1994). "Côte d'Ivoire: Fettered Adjustment." Chapter 3 in I. Hussain and R. Faruqee (eds.), *Adjustment in Africa – Lessons from Country Case Studies*. Washington, DC: The World Bank.

Demery, L. and C. Grootaert (1993). "Correcting for Sampling Bias in the Measurement of Welfare and Poverty in the Côte d'Ivoire Living Standards Survey." *World Bank Economic Review*, Vol. 7, No. 3.

Grootaert, C. (1996). *Analyzing Poverty and Policy Reform – The Experience of Côte d'Ivoire*. Brookfield, Vermont: Avebury.

Grootaert, C. (1995). "Structural Change and Poverty in Africa: A Decomposition Analysis for Côte d'Ivoire." *Journal of Development Economics*, Vol. 47.

Grootaert, C. (1993). "The Evolution of Welfare and Poverty Under Structural Change and Economic Recession in Côte d'Ivoire, 1985-88", Policy Research Working Paper, No. 1078, The World Bank: Washington, DC.

Grootaert, C. (1986). "Measuring and Analyzing Levels of Living in Developing Countries: An Annotated Questionnaire", Living Standards Measurement Study Working Paper, No. 24, The World Bank: Washington, DC.

Grootaert, C. and R. Kanbur (1995). "Child Labor: A Review", Policy Research Working Paper No. 1454, Washington, DC: The World Bank.

Hussmanns, R., F. Mehran and V. Verma (1990). *Surveys of Economically Active Population, Employment, Unemployment and Underemployment: An ILO Manual on Concepts and Methods*. Geneva: ILO.

ILO (1996). "Child Labour: Targeting the Intolerable", Report VI, Part 1, International Labour Conference, 85th Session. Geneva.

ILO (1992). *World Labour Report 1992*. Geneva.

ILO (1986). *Annotated Bibliography on Child Labor*. Geneva: ILO.

Jensen, P. and H. S. Nielsen. (1997). "Child Labor or School Attendance? Evidence from Zambia", *Journal of Population Economics*, Vol. 10.

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

Levy, V. (1985). "Cropping Pattern, Mechanization, Child Labor and Fertility Behavior in a Farming Economy: Rural Egypt." *Economic Development and Cultural Change*, Vol. 33.

Lloyd, C. B. (1994). "Investing in the Next Generation: The Implications of High Fertility at the Level of the Family." New York Population Council, Research Division Working Paper No. 63.

Lloyd, C. B. (ed.) (1993). "Fertility, Family Size and Structure—Consequences for Families and Children." Proceedings of a Population Council Seminar, New York, 9-10 June, 1992. New York: The Population Council.

Maddala, G. (1983). *Limited-Dependent and Qualitative Variables in Econometrics*. Cambridge: Cambridge University Press.

Mason, A. and S. Khandker. (1997). Mimeo, Poverty, Gender and Public Sector Management Department, Washington, DC: The World Bank.

Patrinos, H. and G. Psacharopoulos. (1994). "Educational Performance and Child Labor in Paraguay." *International Journal for Educational Development*, Vol. 15(1).

Patrinos, H., and G. Psacharopoulos (1997). "Family Size, Schooling and Child Labor in Peru: An Empirical Analysis", *Journal of Population Economics*, forthcoming.

Rivera-Batiz, F. L. (1985). "Child Labor Patterns and Legislation in Relation to Fertility." (mimeo) Department of Economics, Indiana University. Bloomington.

Rosenzweig, M. R., and R. Evenson (1977). "Fertility, Schooling, and the Economic Contribution of Children in Rural India: An Economic Analysis." *Econometrica* 45(5).

Sharif, M. (1994). "Child Participation, Nature of Work, and Fertility Demand: A Theoretical Analysis." *Indian Economic Journal*, 40(4).

Siddiqi, F. and H. Patrinos (1995). " Child Labor: Issues, Causes and Interventions." Education and Social Policy Department Discussion Paper No. 53, Washington, DC: The World Bank.

UNICEF (1991). *The State of the World's Children 1991.* Oxford: Oxford University Press.

Policy Research Working Paper Series

	Title	Author	Date	Contact for paper
WPS1883	Intersectoral Resource Allocation and Its Impact on Economic Development in the Philippines	Fumihide Takeuchi Takehiko Hagino	February 1998	K. Labrie 31001
WPS1884	Fiscal Aspects of Evolving Federations: Issues for Policy and Research	David E. Wildasin	February 1998	C. Bernardo 31148
WPS1885	Aid, Taxation, and Development: Analytical Perspectives on Aid Effectiveness in Sub-Saharan Africa	Christopher S. Adam Stephen A. O'Connell	February 1998	K. Labrie 31001
WPS1886	Country Funds and Asymmetric Information	Jeffrey A. Frankel Sergio L. Schmukler	February 1998	R. Martin 39065
WPS1887	The Structure of Derivatives Exchanges: Lessons from Developed and Emerging Markets	George Tsetsekos Panos Varangis	February 1998	P. Kokila 33716
WPS1888	What Do Doctors Want? Developing Incentives for Doctors to Serve in Indonesia's Rural and Remote Areas	Kenneth M. Chomitz Gunawan Setiadi Azrul Azwar Nusye Ismail Widiyarti	March 1998	T. Charvet 87431
WPS1889	Development Strategy Reconsidered: Mexico, 1960–94	Toru Yanagihara Yoshiaki Hisamatsu	March 1998	K. Labrie 31001
WPS1890	Market Development in the United Kingdom's Natural Gas Industry	Andrej Juris	March 1998	S. Vivas 82809
WPS1891	The Housing Market in the Russian Federation: Privatization and Its Implications for Market Development	Alla K. Guzanova	March 1998	S. Graig 33160
WPS1892	The Role of Non-Bank Financial Intermediaries (with Particular Reference to Egypt)	Dimitri Vittas	March 1998	P. Sintim-Aboagye 38526
WPS1893	Regulatory Controversies of Private Pension Funds	Dimitri Vittas	March 1998	P. Sintim-Aboagye 38526
WPS1894	Applying a Simple Measure of Good Governance to the Debate on Fiscal Decentralization	Jeff Huther	March 1998	S. Valle 84493
WPS1895	The Emergence of Markets in the Natural Gas Industry	Andrej Juris	March 1998	S. Vivas 82809
WPS1896	Congestion Pricing and Network Expansion	Thomas-Olivier Nasser	March 1998	S. Vivas 82809

Policy Research Working Paper Series

	Title	Author	Date	Contact for paper
WPS1897	Development of Natural Gas and Pipeline Capacity Markets in the United States	Andrej Juris	March 1998	S. Vivas 82809
WPS1898	Does Membership in a Regional Preferential Trade Arrangement Make a Country More or Less Protectionist?	Faezeh Foroutan	March 1998	L. Tabada 36896
WPS1899	Determinants of Emerging Market Bond Spread: Do Economic Fundamentals Matter?	Hong G. Min	March 1998	E. Oh 33410
WPS1900	Determinants of Commercial Bank Interest Margins and Profitability: Some International Evidence	Asli Demirgüç-Kunt Harry Huizinga	March 1998	P. Sintim-Aboagye 37656
WPS1901	Reaching Poor Areas in a Federal System	Martin Ravallion	March 1998	P. Sader 33902
WPS1902	When Economic Reform is Faster than Statistical Reform: Measuring and Explaining Inequality in Rural China	Martin Ravallion Shaohua Chen	March 1998	P. Sader 33902
WPS1903	Taxing Capital Income in Hungary and the European Union	Jean-Jacques Dethier Christoph John	March 1998	J. Smith 87215
WPS1904	Ecuador's Rural Nonfarm Sector as a Route Out of Poverty	Peter Lanjouw	March 1998	P. Lanjouw 34529