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An Empirical Study of Child Labor Participation in Madagascar

Introduction:

This paper examines the effect of household characteristics on child labor

participation by using the survey data from Madagascar during 2004 to 2005. The

organization of this paper is as follows. Section I outlines the statistics of the sample.

Section II describes the independent variables used in the regression. The regressors

include household composition, child characteristics and the relationship to the head of

household. In section III, I compare the results of the logit model to Fafchamps and

Wahba's paper (2006). The last section shows the new regression with annual

expenditure and discusses the endogenous problem as well as the possible instrument

variable estimator.

Statistics:

In the sample, the total number of observations is 41,525, and there are 15,642

children who are between 6 and 15 years of age. During the survey, the children were

asked about their employment situation such as: "How many hours per day do you work?"

and "What is your job?" For those respondents who reported that they have not worked

more than an hour in last 7 days and do not have permanent employment, they are

assumed to have zero work hours. In total 28 kinds of jobs were reported and I divide

them into three categories: Agriculture, Non-agriculture and household chores. To study

child labor in this country, the other main factor besides employment is schooling. The

individuals were asked whether they were attending school in 2004 to 2005. If the

individual did not answer the question and was not registered in a school during 2004 to 2005 or has not attended school, I assume that the respondent was not attending school.

Table 1 is the statistical report for the data. The school attendance is about 72% of children aged 6-15 and it is almost the same between boys and girls. And the old children who are 11-15 years of age have higher attendance rate than young children (aged 5-10). There are less than 13% of all children who are not doing any work and the percentage drops for old children. And the old children work eight hours more per week in all work than young children. More than 85% of girls are working on all work, which is slightly higher than boys. It can be explained by the higher percentages of girls working in household chores than that of boys. The report shows that 86% of all children participate in household chores and the average work hours are around eight hours per week. Less than one quarter of all children engage in agriculture work, and the percentage of old children on agriculture work is more than twice that of young children. Boys tend to spend more time on agriculture work than girls. Although there is only 2.5% of all children working on non-agriculture work, the average work hours is higher than other categories. The surveyed children spend roughly 38 hours per week on non-agriculture work. Over all, participation and number of hours worked in all work categories increases with age as well as school attendance.

Table1
Child work and schooling

	All	Boys	Girls	Aged 5-10	Aged 11-15
A. Schooling					
% Children attending school	71.8%	72.04%	71.5%	67.6%	76.8%
B. Work					
Agriculture					
% of children doing agricultural work	18.8%	19.1%	18.6%	13.1%	25.7%
Hours per week	4.6	4.9	4.4	2.8	6.9
Hours per week for those who work	24.7	25.8	23.5	21.0	26.9
Non-agriculture					
% of children doing non-agricultural work	2.5%	2.8%	2.2%	1%	4.2%
Hours per week	0.9	1.1	0.8	0.3	1.7
Hours per week for those who work	37.9	38.7	36.9	32.4	39.5
Household chores					
% of children doing Household chores work	85.8%	84.4%	87.1%	81.3%	91.2%
Hours per week	7.1	6.5	7.6	5.6	8.8
Hours per week for those who work	8.2	7.7	8.7	6.9	9.6
All work					
% of children doing any work	87.1%	86.3%	87.9%	82.3%	92.8%
Hours per week	12.6	12.5	12.8	8.7	17.3
Hours per week for those who work	14.5	14.5	14.5	10.6	18.7
Number of observations	15,642	7,858	7,784	8,532	7,110

Empirical Result:

Table 2 summarizes the household composition, relationship to the household head and individual characteristics that are included in the regression. For the household composition, I include the number of members and the number of siblings in the household. Based on Cooperative bargaining model, child who is living in large household size should work less because of the sharing rule. For the number of siblings in the household, I use the information of the relationship to the head of household as an approximated estimate. The other variable is number of other children who are younger than 6-years-old in the household. It should be highly correlated to household chores because older child usually has to take care of young children in the household. In this

sample, there is about one quarter of household heads do not have spouses and it should affect the household's welfare weights. Over half of head of household works in agriculture and it is consistent to the statistics result in Table 1 that also shows a higher percentage of children engage in agriculture work compare to non-agriculture work.

The relationship to the head of household can be summarized into six categories. I use dummy variable for each category. Most of children are the son or daughter of head of household and they should work less under hypothesis. On the other hand, only 0.27% of children are servants and they are assumed to work more than other categories. The individual characteristics include gender, age and relative birth order. The birth order is highly correlated to welfare weights. The first child tends to obtain more benefit from their parents. Since I do not have data about birth order and siblings, I use the information of age and relationship to estimate. I treat the children as siblings if they have the same relationship to the head of household and combine the information with age to estimate the birth order. The way to calculate relative birth order is the same as Fafchamps and Wahba[1]. Since the birth order matters differently for boys and girls, it is computed separately.

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[1] relative birth order $: r = \bar{R} - R_i$

       where $\bar{R}$ denotes the average birth order of all children in the household, R_i denotes the birth order (i.e., firstborn=1, second born=2, etc.)

Table 2
Descriptive statistics of children aged 6-15

	Mean	S.D.
Individual characteristics		
Percentage of boys	50.24%	
Average age in years	10.24	2.889465
Relative birth order of boys (including children<5)	0.04	0.5589256
Relative birth order of girls (including children<5)	0.06	0.5332078
Relationship to the head of household (%)		
Son/daughter/son- or daughter-in-law	82.38%	
Grandchild	11.23%	
Sister/brother	1.64%	
Niece/Nephew	2.85%	
Servant	0.27%	
Other	1.62%	
Household's characteristics		
Number of members in the household	5.66	2.175624
Number of siblings in the household	4.11	2.042951
Number of children less than 6 years in household	1.31	1.20215
Percentage of households in which head has no spouse	24.27%	
% of households in which head works in agriculture	63.32%	
% of households in which spouse of head works in agriculture	66.82%	
Number of observations	15,642	

Logit Model:

Table 3 is the regression result. It shows that the urban dummy has significant effect on agriculture work, house work as well as school attendance. The coefficient indicates that children living in urban area have lower probability to work and higher chance to attend school. It is consistent with Fafchamps and Wahba's result. But effect of urban dummy is smaller on school attendance and not significant on non-agriculture work in this model. Over all, most of the province dummies are significant and consistent

across regressions. Take the Toliara dummy for instance, children living in that area has higher chance to participate in agriculture work and less probability to attend school. The Fianarantsoa dummy is the only province dummy showing any inconsistency. The coefficient indicates that children living in that area work less but also attend school less.

The results of child characteristics are similar to Fafchamps and Wahba's result. The old child dummy works well and shows that children aged between 10 and 15 are more likely to work in all work categories and attend school. The gender dummy shows that boys are more likely to enter agriculture as well as non-agriculture work and girls are more likely to undertake housework. And it also indicates that boys are more likely to go to school but the coefficient is not significant. The sign of relative birth order among boys and girls conflicts the expectation that firstborn children are "favored" by their parents. It shows that both firstborn boys and girls tend to participate in all work categories. Fafchamps and Wahba argue that it is because the firstborn children are "sacrificed" and asked to work by their parents. The ideal can also be supported by the positive effect of the number of young children in the household on the participation. However, the result also shows that firstborn children are more likely to attend school, which is quite different from Fafchamps and Wahba. The possible explanation is that the education of the household head and his spouse are not included in the regression. Since these omitted variables have positive effect on both school attendance and number of children, the coefficient could be over-estimated.

The dummy variables of relationship to the head of household are consistent and similar to the result of Fafchamps and Wahba. The servants are more likely to work in all work categories and less likely to attend school. The children who are more closely

related to the household head, on the other hand, are less likely to work. The effect of household size supports the sharing rule and is similar to what Fafchamps and Wahba found. The children are less likely to work if there are more members in the household. Since some of the variables discussed before are omitted in the regressions, the result can be incorrect or inconsistent. In next Table, I include the household expenditure and compare the results to Table 3.

Table 3
Logit regression on child work and school attendance

	Dependent variable =1 if child engaged in							
	Agriculture work		Non-agriculture work		House work		Attending school	
	Coefficient	t-statistics	Coefficient	t-statistics	Coefficient	t-statistics	Coefficient	t-statistics
Urban and Rural								
Urban Dummy	-0.55***	-12.62	-0.002	-0.02	-0.15***	-3.27	0.45***	11.95
Province Dummy								
Antananarivo(omitted)								
Fianarantsoa	-0.2***	-3.01	-0.6***	-3.66	-0.18**	-2.55	-0.2***	-3.36
Toamasina	-0.62***	-7.08	-1.03***	-11.24	0.05	0.55	0.14**	1.98
Mahajanga	0.19***	2.89	-0.24	-1.47	0.64***	7.33	-0.73***	-12.13
Toliara	0.54***	8.49	-0.04	-0.25	-0.36***	-4.94	-0.48***	-8
Antsiranana	-1.15***	-9.37	-1.69***	-4.55	0.35***	3.16	0.04	0.42
Child characteristics								
Old child dummy(10-15)	0.87***	18.51	1.48***	10.85	0.75***	13.8	0.27***	6.57
Male dummy	0.04	0.98	0.3***	2.6	-0.21***	-4.52	0.02	0.52
Relative birth order among boys	0.1 5***	3.91	0.13	1.36	0.18***	4.14	0.17***	4.8
Relative birth order among girls	0.16***	3.96	0.07	0.59	0.24***	4.8	0.18***	4.71
Relationship to head of household								
Dummy=1 if son/daughter of head of household	-0.54***	-3.52	-0.47	-1.5	-0.6**	-2.52	0.67***	4.85
Dummy=1 if grandchild of head of household	-0.48***	-2.97	-0.62*	-1.75	-0.51**	-2.07	0.44***	3.02
Dummy=1 if sister/brother of head of household	-0.94***	-3.89	-0.45	-0.97	-0.48	-1.55	0.66***	3.32
Dummy=1 if niece/nephew of head of household	-0.51***	-2.64	0.01	0.03	0.05	0.18	0.57***	3.32
Dummy=1 if servant of head	1.3***	2.59	4.64***	8.86	1.26	1.21	-2.95***	-5.41

of household

Household characteristics

Number of members in the household	-0.01	-0.45	-0.11**	-2.29	-0.1***	-5.33	0.1***	5.88
Number of siblings in the household	0.04**	2.06	-0.01	-0.1	0.15***	6.61	0.01	0.67
Number of children less than 6 years in the household	0.03	1.45	0.19***	3.09	0.15***	5.72	-0.33***	-16.21

Testing relationship to head of household

	$X^2(4)$	p-value	$X^2(4)$	p-value	$X^2(4)$	p-value	$X^2(4)$	p-value
Joint significance of relationship dummies	17.7	0.0014	5.94	0.2037	19.94	0.0005	35.01	0

* Denotes significance at 10%, ** at the 5%, *** at 1 %.

Logit model with household expenditure:

Table 4 summarizes the results of regression that include the log of annual expenditure per capita in the household. The expenditure is deflated and adjusted for household composition by using Paasche index and AE[2]. The effect of urban dummy does not change a lot after including expenditure. It still shows that children living in urban area are less likely to engage in agriculture work and housework and more likely to attend school. Although the effect of urban dummy becomes positive on non-agriculture work, the coefficient is not significant. The signs of child characteristics variables remain the same in the new regressions. However, in household composition, the effect of number of young children in the household is unreasonable after the change. It shows that the children who have more young children in the household are less likely to work on house chores. The sign of number of siblings in the household is also different from the result of Fafchamps and Wahba.

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[2] For the AE, adults are defined as individuals age 16 and above: AE=$(A+0.4K)^{0.8}$, where A denotes number of adults in the household and K denotes number of kids in the household.

The effect of expenditure is inconsistent in the model. The result indicates that the children living in the high expenditure household are more likely to work in agriculture work and housework but not non-agriculture work, and these children are more likely to attend school. The result does not coincide with theory and could be incorrect because of the endogenous problem. Since expenditure can be an index for income, the endogenous problem comes from the high correlation between income and the unobserved factors such as health and adult labor efficiency. For example, the children are more likely to attend school if they are healthy and the children are less likely to work if ability of adult in the household is high. Using instrument variable estimators such as the total value of durables in the household can solve the endogenous problem. It can be a good IV estimator because the following reason: First of all, the value of durables such as car, land or house is highly correlated to expenditure. Second, health of children is more likely correlated to the expenditure on food but less likely correlated to the value of durable goods. Third, the adult's ability is correlated to his/her own education but less likely correlated to the expenditure on durables.

Table 4
Logit regression on child work and school attendance (with expenditure)

	Dependent variable =1 if child engaged in							
	Agriculture work		Non-agriculture work		House work		Attending school	
	Coefficient	t-statistics	Coefficient	t-statistics	Coefficient	t-statistics	Coefficient	t-statistics
Urban and Rural								
Urban Dummy	-0.56***	-12.74	0.01	0.12	-0.17***	-3.6	0.43***	11.56
Province Dummy								
Antananarivo(omitted)								
Fianarantsoa	-0.19***	-2.77	-0.74***	-4.42	-0.13*	-1.8	-0.16***	-2.67
Toamasina	-0.59***	-6.66	-1.25***	-5.35	0.15*	1.68	0.22***	3.02
Mahajanga	0.2***	2.98	-0.27*	-1.68	0.66***	7.58	-0.71***	-11.85
Toliara	0.55***	8.59	-0.11	-0.71	-0.33***	-4.49	-0.46***	-7.62
Antsiranana	-1.14***	-9.3	-1.77***	-4.73	0.37***	3.34	0.06	0.67
Child characteristics								
Old children dummies	0.86***	18.46	1.5***	10.99	0.75***	13.74	0.26***	6.41
Male dummy	0.04	0.98	0.29**	2.52	-0.22***	-4.58	0.02	0.48
Relative birth order among boys	0.15***	3.87	0.15	1.47	0.18***	4.02	0.17***	4.7
Relative birth order among girls	0.16***	3.96	0.07	0.58	0.23***	4.76	0.18***	4.69
Relationship to head of household								
Dummy=1 if son/daughter of head of household	-0.52***	-3.41	-0.56*	-1.77	-0.59**	-2.44	0.7***	5.06
Dummy=1 if grandchild of head of household	-0.47***	-2.87	-0.72**	-2.01	-0.47*	-1.92	0.48***	3.26
Dummy=1 if sister/brother of head of household	-0.91***	-3.78	-0.59	-1.27	-0.42	-1.35	0.73***	3.62
Dummy=1 if niece/nephew of head of household	-0.51***	-2.6	0.001	0	0.05	0.16	0.58***	3.36
Dummy=1 if servant of head of household	1.3***	2.58	4.71***	8.96	1.24	1.19	-2.97***	-5.42
Household characteristics								
Number of members in the household	0.01	0.56	-0.26***	-4.59	-0.05*	-2.18	0.15***	8.08
Number of siblings in the household	0.05**	2.14	-0.02	-0.35	0.16***	6.99	0.02	0.94
Number of children less than 6 years in the household	0.04	1.58	0.18***	2.88	-0.14***	-5.37	-0.33***	-15.91
Household expenditure								
Log of total expenditure per capita	0.09**	2.51	-0.63***	-6	0.29***	6.59	0.23***	6.65
Testing relationship to head of household								

	X^2(4)	p-value	X^2(4)	p-value	X^2(4)	p-value	X^2(4)	p-value
Joint significance of relationship dummies	16.66	0.0022	7.85	0.0972	19.07	0.0008	36.42	0

* Denotes significance at 10%, ** at the 5%, *** at 1 %.

Reference:

Fafchamps and Wahba, "Child labor, urban proximity, and household composition." (Jan., 2006), Page 374-397.