ECONOMICS BULLETIN

Household shocks and child labor in rural Malawi

Seife Dendir
Department of Economics, Radford University

Abstract

This paper investigates the impact of household shocks on the incidence and intensity of child labor in rural Malawi. Intensity is measured as the reported number of sessions that a child was working. Probit and zero-inflated negative binomial estimates fail to provide evidence in support of the hypothesis that child labor increases in response to the occurrence of shocks.

Financial support through the COBE-RU summer research grant is gratefully acknowledged.
Citation: Dendir, Seife, (2007) "Household shocks and child labor in rural Malawi." *Economics Bulletin,* Vol. 4, No. 1 pp. 1-8
Submitted: January 9, 2007. **Accepted:** January 15, 2007.
URL: http://economicsbulletin.vanderbilt.edu/2007/volume4/EB-07D10002A.pdf

1. Introduction

Child labor and its potential causes have been subject to increased scrutiny in the economic literature in the past decade. Various hypotheses exist as to what explains the relatively widespread incidence of child labor in the developing world. The oft-mentioned cause is poverty, whereby subsistence living compels households to augment conventional resources with child income (Basu and Van, 1998).

A related but relatively recent strand of the literature points out that child labor may vary by households' ability to respond to unexpected income shocks. In economies that lack formal credit and insurance markets, households can increase child labor supply to buffer the effects of negative shocks, very much like they can do with sales of assets, running down savings and informal social networks of transfers and loans. Child labor allows households to partially offset income loss directly—through child wage income—or indirectly—by freeing up adult labor from household work or chores. According to this hypothesis, all else equal, increases in child labor incidence and/or intensity should be associated with households that have experienced such negative shocks.

Few studies have tested such hypothesis. Guarcello et al. (2003), Duryea et al. (2003) and Beegle et al. (2006) examine child labor response to household shocks in Guatemala, Brazil and Tanzania, respectively. Other studies have shown the effects of shocks and uncertainties on child schooling (Jacoby and Skoufias, 1997; Jensen, 2000; Fitzsimmons, 2003).

In this study, the response of child labor to shocks is examined using a unique panel dataset from Malawi. Shocks are measured as incidences of death and illness/accident in a household, and self-reported changes to overall household well-being. The use of indicator variables representing occurrences of sickness, unemployment, death and such is favored in the literature because it likely obviates bias arising from measurement errors and endogeneity (e.g. in income) (see for example, Cochrane, 1991; Guarcello et al., 2003 and Duryea et al., 2003 provide applications in child labor analysis). Subjective measures of well-being are also used in the risk-sharing literature to assess household responses to perceived fluctuations in welfare (Fafchamps and Lund, 2003).

2. Data

The data come from the Malawi Rural Financial Markets and Household Food Security surveys conducted by the International Food Policy Research Institute (IFPRI) in collaboration with the Rural Development Department of Bunda College of Agriculture, Malawi. The surveys were conducted in three rounds from February to December 1995 on 404 households in forty-five villages in five districts. Detailed information was collected on various activities of households and members including demographics, asset ownership and transactions, credit access and labor supply.

Information on child labor supply was collected on 7-11 year-olds residing in the sample households. In particular, households gave detailed accounts of the activities of children at different times in the two days before the survey (in each round). The specific blocks of time (or sessions, for the purposes of this study) that households were inquired on are 7-10am, 10-12am, 12-3pm and 3-6pm. Exact accounts of children's activities in each session ranged from non-labor activities like playing or resting, to various household chores and nonmarket work, to wage-earning labor.

For the purposes of this study, responses on each session were recoded to reflect the activity of a child as labor versus non-labor. Based on such recoding, two variables were constructed to measure the incidence and intensity of child labor. The incidence variable is a dummy variable which equals 1 if a child was involved in labor activity at least for one session and zero otherwise. The intensity variable is a count that measures the number of sessions a child was reported as working (ranging from 0-8 sessions). Measuring both incidence and intensity is important because presumably households can respond to shocks by engaging [formerly] non-working children in work or by increasing the amount of work done by [already] working children.

We use four proxies for shocks. The first three are indicators of shock occurrences in the household: a dummy variable which equals 1 if a household experienced death of a head, zero otherwise; a dummy which equals 1 if a household experienced death of a member, zero otherwise; a dummy which equals 1 if a household experienced at least one illness/accident, zero otherwise. The fourth is based on a household's own assessment of well-being as measured by self-reported 'number of positive events in the household between rounds'. Again a dummy variable is constructed equaling 1 if a household reported at least one positive event and zero otherwise. If the hypothesis holds, the first three shock indicators should enter a child labor equation positive and significant while the positive event dummy should be negative and significant.

In measuring the impact of shocks on child labor, we control for a large array of child and household characteristics that provide useful insights into the determinants of child labor. After excluding observations with missing data, the final pooled sample consisted of 936 children. Summary statistics on relevant variables are given in Table 1.

3. Estimation and Results

Child labor incidence is estimated using a Probit model of the likelihood that a child works as a result of shocks in the household. In the model, we control for a large set of child and household characteristics that potentially affect the probability that a child works. These include sex, age, relationship to head, and schooling of child; head's sex, age and education; and household characteristics—size, number of children under age 6, dependency ratio, occupation/livelihood and access to credit. Even after controlling for this set of characteristics, child labor could be affected by household unobservables (e.g. attitude towards risk) that may be correlated with various observables and, if not controlled for, could cause bias in estimated coefficients. To address such concerns, we use the longitudinal structure of the data to allow for household heterogeneities and report random effects probit estimates in addition to the pooled model. The results are presented in Table 2.

The results show that there is no evidence of increase in the likelihood that a child works as a result of the occurrence of shocks. In fact, of the four shock variables, only death of a member and illness/accidents in the household are significant but have opposite to the expected sign. The likelihood that a child works decreases when there is sickness/accident or death of a member experienced by the household. While these results are contrary to the insurance hypothesis, they are robust to controlling for household random effects.

The other variables that have significant effect on child labor incidence are child's sex and age, female headedness, spouse's education, number of dependents below the age of six and credit access. Female children are 19 percentage points more likely to work compared to males. Older children are also more likely to spend time working. Interestingly, the likelihood of child work decreases, on average, by 16 percentage points if the household head is female. Similarly, spouse's education (which can for the most part be interpreted as mother's education) reduces the likelihood that a child works.[1] Household's access to credit decreases probability of work by 6 percentage points.

As noted above, next we estimate whether shocks increase the amount of child labor. For this a count model of the number of sessions of child work is estimated. Over the two days of inquiry, a child can engage from zero (no work at all) to 8 sessions of work. The summary statistics in Table 1 show that in the pooled sample, about half of the children did not work at all while the average number of sessions of work was 1.6. In estimating count data models of such scenario, two issues are relevant: overdispersion (which is generally indicated by a count variable having a variance larger than the mean) and excess zeros (where a large number of observations exhibit zero counts). In our case, the fact that the variance (4.2849) of the count is larger than the mean (1.55) hints towards overdispersion. Also, the fact that half of the sample reported zero sessions of work implies excess zero models that allow for structural determination of the probability of zero occurrences along with count estimates may be more appropriate.

To address both issues, we conduct appropriate statistical tests. Likelihood ratio tests favor overdispersion models: the negative binomial (NB) over Poisson, and the zero-inflated negative binomial (ZINB) over zero-inflated Poisson (ZIP). Next, Vuong's (1989) test of non-nested distributions shows that ZINB outperforms NB in all specifications. Accordingly, estimates of the ZINB model are presented in Table 3.

Looking at the estimates, only one shock variable is significant in affecting number of child labor sessions but with a sign opposite to a priori. Here, death of the head reduces the number of sessions of child labor by about 40 percent.[2] In similar tune with the probit regressions, we fail to find evidence that household shocks cause an increase in child labor use. Other variables that significantly impact child labor intensity are child's age, school attendance, and household land size and dependency ratio. Older children

[1] Ideally, one would like to have child's father's and mother's education. However, such information is not available in the surveys and, therefore, head's and spouse's education is used.
[2] This is computed as 100[exp(-0.509)-1] where the exponentiated coefficient, exp(-0.509), is commonly referred to as the incidence-rate ratio in count data models.

typically work more sessions, while school attendance has the opposite effect. Children in households with larger land sizes work more. Dependency ratio mitigates child labor probably due to the sharing of tasks among more potential helpers in the household.[3]

4. Conclusion

This paper tests the hypothesis that in poor developing economies where formal insurance mechanisms are likely to be absent, the occurrence of shocks could potentially induce child labor supply. Controlling for a large set of determinants of child labor, we find no evidence that such a relationship exists between shock proxies and child labor supply of 7-11 year-olds in rural Malawi.

Failure to find evidence in support of the insurance hypothesis could reflect that households resort to other mechanisms in protecting themselves from the negative repercussions of shocks. What exactly these other measures are—running down savings, sale of assets, increase in labor supply of other adult members, labor sharing with other households, formal and informal loans and transfers, etc—is a future research question. However, the estimation results further suggest that child labor in fact decreases with the occurrence of some shocks. This is interesting because it could point to a variety of situations. For instance, it could point to an overall decrease in economic activity in households that are coping with death or sickness of members. On the other hand, it could also imply that whatever the response to such shocks, it has an overreaching impact in relieving children in afflicted households from labor, at least temporarily. There are accounts of informal insurance networks whereby sickness, accident or death in a household brings forth assistance in the form of labor and other resource sharing from network members (Scott, 1976; Platteau, 1997). Of course, such scenarios are simple conjectures at this stage but not implausible in closely-knit social structures as in rural Africa.

Finally, useful insights could be derived from the other important determinants of child labor. The usual finding that girls bear the brunt of child labor in poor economies is reaffirmed. The results also suggest that increased access to schooling, women empowerment and household credit access are all potentially fruitful policy options in mitigating child labor.

[3] Estimations using the number of sicknesses/accidents, deaths and positive events in the household (instead of dummies) yielded qualitatively similar results in both probit and count models.

References

Beegle, K., Dehejia, R. H., and Gatti, R. (2006) Child labor and agricultural shocks, *Journal of Development Economics*, forthcoming.

Basu, K. and Van, P.H. (1998) The economics of child labor, *American Economic Review*, **88**, 412-427.

Cochrane, J.H. (1991) A simple test of consumption insurance, *Journal of Political Economy*, **99**, 957-976.

Duryea, S., Lam, D. and Levison, D. (2003) Effects of economic shocks on children's employment and schooling in Brazil, University of Michigan Population Studies Center Research Report 03-541.

Fafchamps, M. and Lund, S. (2003) Risk-sharing networks in rural Philippines, *Journal of Development Economics*, **71**, 261-287.

Fitzsimmons, E. (2003) The effect of risk on education and child labor, Institute of Fiscal Studies, WP 02/07.

Guarcello, L., Mealli, F. and Rosati, F.C. (2003) Household vulnerability and child labor: The effect of shocks, credit rationing and insurance, Understanding Children's Work, manuscript.

Jacoby, H. and Skoufias, E. (1997) Risk, financial markets, and human capital in a developing country, *Review of Economic Studies*, **64**, 311-315.

Jensen, R. (2000) Agricultural volatility and investments in children, *American Economic Review*, **90**, 399-404.

Platteau, J.P. (1997) Mutual insurance as an elusive concept in traditional rural communities, *Journal of Development Studies*, **33**, 764-796.

Scott, J. (1976) *The moral economy of the peasant. Rebellion and subsistence in Southeast Asia*, New Haven: Yale University Press.

Vuong, Q.H. (1989) Likelihood ratio tests for model selection and non-nested hypotheses, *Econometrica*, **57**, 307-333.

Table 1: Variable definitions and summary statistics

Variable	Definition	Mean (Std. dev)
D_CWRK	Worked at least one session=1 if yes, else 0	0.50(0.50)
CSESSNS	Number of child labor sessions	1.55(2.07)
D_CFEM	Female child=1 if yes, else 0	0.49(0.50)
CAGE	Age	8.74(1.59)
D_CSOD	Son/daughter of head=1 if yes, else 0	0.82(0.39)
D_CPRIM	Child has attended primary school=1 if yes, else 0	0.82(0.38)
HHFAEQ	Household farm equipment value	199.61(538.36)
HHLAND	Household Land in hectares	2.03(1.34)
D_HFEM	Female head=1 if yes, else 0	0.27(0.44)
HAGE	Head's age	46.03(11.40)
D_HILT	Head illiterate=1 if yes, else 0	0.21(0.41)
D_HREAD	Head can read/write=1 if yes, else 0	0.48(0.50)
D_HPRIM	Head completed primary school=1 if yes, else 0	0.24(0.43)
D_HJUN	Head completed junior or above=1 if yes, else 0	0.07(0.26)
D_SILT	Spouse illiterate=1 if yes, else 0	0.32(0.47)
D_SREAD	Spouse can read/write=1 if yes, else 0	0.49(0.50)
D_SPRIM	Spouse completed primary or above=1 if yes, else 0	0.19(0.39)
HHSIZE	Household size	6.61(2.22)
BOYS6	Population boys under 6 years	0.76(0.89)
GIRLS6	Population girls under 6 years	0.55(0.78)
HHDRAT	Dependency ratio-(<15 + >64)/household size	0.60(0.14)
HHFARM	Farming household=1 if yes, else 0	0.65(0.48)
HHCRED	Household member of a credit program=1 if yes, else 0	0.62(0.49)
D_HDIED	Head died in past 4 months=1 if yes, else 0	0.03(0.17)
D_MDIED	Member/s died in past 4 months=1 if yes, else 0	0.19(0.39)
D_ILAC	Illness/accident in past 4 months=1 if yes, else 0	0.13(0.34)
D_PEVNT	Reported at least one positive event=1 if yes, else 0	0.30(0.46)
N		936

- *Note*: Household farm equipment value is in Malawian currency, the Kwacha.

Table 2: Probit estimates of child labor incidence

	(1)		(2)		(3)		(4)	
	Pooled probit	RE probit	Pooled probit	RE probit	Pooled probit	RE probit	Pooled probit	RE probit
D_HDIED	-0.002(0.02)	0.003(0.03)						
D_MDIED			-0.080*(1.71)	-0.082*(1.69)				
D_ILAC					-0.135***(2.63)	-0.131***(2.47)		
D_PEVNT							0.044(1.04)	0.042(0.94)
D_CFEM	0.185***(5.33)	0.189***(5.25)	0.188***(5.40)	0.191***(5.32)	0.186***(5.35)	0.189***(5.33)	0.183***(5.25)	0.187***(5.19)
CAGE	0.043***(3.58)	0.044***(3.55)	0.043***(3.53)	0.044***(3.52)	0.044***(3.62)	0.044***(3.61)	0.043***(3.56)	0.044***(3.54)
D_CSOD	-0.053(1.01)	-0.052(0.95)	-0.060(1.15)	-0.059(1.08)	-0.047(0.90)	-0.046(0.86)	-0.054(1.04)	-0.053(0.97)
D_CPRIM	0.051(1.00)	0.059(1.10)	0.049(0.96)	0.057(1.06)	0.055(1.06)	0.060(1.13)	0.050(0.97)	0.057(1.06)
HHFAEQ	0.003(0.69)	0.003(0.65)	0.003(0.77)	0.003(0.71)	0.003(0.85)	0.003(0.78)	0.003(0.77)	0.003(0.72)
HHLAND	0.027*(1.71)	0.027(1.58)	0.024(1.53)	0.024(1.40)	0.025(1.56)	0.025(1.48)	0.025(1.57)	0.025(1.46)
D_HFEM	-0.162***(3.46)	-0.164***(3.34)	-0.158***(3.37)	-0.160***(3.27)	-0.171***(3.65)	-0.172***(3.59)	-0.164***(3.52)	-0.165***(3.39)
HAGE	0.032(0.16)	0.033(0.16)	0.024(0.12)	0.025(0.12)	0.059(0.30)	0.059(0.29)	0.034(0.17)	0.036(0.17)
D_HREAD	-0.007(0.13)	-0.001(0.02)	-0.015(0.28)	-0.010(0.17)	-0.003(0.06)	0.001(0.00)	-0.009(0.16)	-0.004(0.06)
D_HPRIM	-0.025(0.36)	-0.019(0.25)	-0.027(0.38)	-0.021(0.28)	-0.024(0.34)	-0.020(0.26)	-0.029(0.41)	-0.023(0.30)
D_HJUN	0.008(0.08)	0.009(0.09)	0.008(0.09)	0.010(0.10)	-0.014(0.15)	-0.012(0.12)	0.004(0.04)	0.005(0.05)
D_SREAD	-0.076*(1.63)	-0.078(1.56)	-0.072(1.54)	-0.074(1.48)	-0.077*(1.66)	-0.079(1.61)	-0.080*(1.71)	-0.082*(1.63)
D_SPRIM	-0.108*(1.65)	-0.114*(1.63)	-0.111*(1.69)	-0.117*(1.67)	-0.104(1.57)	-0.108(1.56)	-0.111*(1.69)	-0.117*(1.67)
HHSIZE	-0.016(1.54)	-0.016(1.33)	-0.015(1.44)	-0.015(1.25)	-0.019*(1.78)	-0.018(1.59)	-0.016(1.55)	-0.016(1.34)
BOYS6	0.071***(2.76)	0.069**(2.38)	0.073***(2.84)	0.071***(2.46)	0.072***(2.83)	0.071***(2.51)	0.065***(2.46)	0.063***(2.15)
GIRLS6	0.091***(3.30)	0.092***(3.04)	0.092***(3.35)	0.093***(3.08)	0.096***(3.46)	0.096***(3.26)	0.090***(3.27)	0.090***(3.02)
HHDRAT	-0.160(1.08)	-0.145(0.90)	-0.184(1.23)	-0.168(1.04)	-0.178(1.19)	-0.167(1.06)	-0.157(1.06)	-0.143(0.89)
HHFARM	0.037(0.81)	0.040(0.79)	0.037(0.80)	0.040(0.77)	0.022(0.48)	0.025(0.49)	0.040(0.86)	0.042(0.82)
HHCRED	-0.062*(1.63)	-0.071*(1.72)	-0.063*(1.64)	-0.071*(1.73)	-0.054(1.41)	-0.060(1.48)	-0.062*(1.63)	-0.070*(1.71)
Log-likelihood	-578.7795	-577.7877	-577.2767	-576.3834	-575.3922	-574.9387	-578.2313	-577.3503
Wald chi2(26)		112.6		114.71		120.72		113.82
Pseudo R2	0.1079		0.1102		0.1131		0.1087	

- *Note*: The dependent variable is 'child worked at least one session=1 if yes, else 0'. Marginal effects are reported. |t| are shown in parentheses. Regressions also included district and round dummies. Illiterate heads and spouses are the excluded educational categories. Random effects are at the household level.

Table 3: ZINB estimates of number of child labor sessions

	(1)	(2)	(3)	(4)
D_HDIED	-0.509*(1.76)			
D_MDIED		-0.130(1.36)		
D_ILAC			-0.177(1.57)	
D_PEVNT				0.070(0.93)
D_CFEM	0.070(1.02)	0.080(1.15)	0.086(1.24)	0.076(1.09)
CAGE	0.057***(2.53)	0.055**(2.43)	0.053**(2.37)	0.054**(2.37)
D_CSOD	-0.016(0.16)	-0.028(0.28)	-0.011(0.11)	-0.014(0.14)
D_CPRIM	-0.234**(2.40)	-0.223**(2.28)	-0.213**(2.18)	-0.227**(2.32)
HHFAEQ	0.006(1.00)	0.007(1.06)	0.006(0.98)	0.007(1.03)
HHLAND	0.045*(1.70)	0.042(1.56)	0.044*(1.65)	0.043(1.62)
D_HFEM	-0.026(0.25)	-0.026(0.25)	-0.057(0.54)	-0.048(0.46)
HAGE	0.004(1.01)	0.004(1.00)	0.004(1.05)	0.004(1.03)
D_HREAD	-0.052(0.53)	-0.065(0.65)	-0.053(0.53)	-0.055(0.55)
D_HPRIM	0.076(0.57)	0.066(0.50)	0.067(0.50)	0.063(0.47)
D_HJUN	0.099(0.56)	0.107(0.61)	0.095(0.54)	0.114(0.65)
D_SREAD	-0.031(0.35)	-0.029(0.32)	-0.022(0.24)	-0.036(0.41)
D_SPRIM	-0.018(0.14)	-0.022(0.17)	-0.008(0.06)	-0.022(0.17)
HHSIZE	-0.032(1.41)	-0.031(1.37)	-0.034(1.49)	-0.032(1.41)
BOYS6	0.100(1.61)	0.113*(1.78)	0.100(1.59)	0.095(1.48)
GIRLS6	0.056(1.02)	0.060(1.10)	0.057(1.04)	0.055(1.00)
HHDRAT	-0.670*(1.83)	-0.757**(2.04)	-0.739**(1.99)	-0.724**(1.96)
HHFARM	-0.091(0.92)	-0.094(0.95)	-0.122(1.22)	-0.098(0.98)
HHCRED	0.072(0.97)	0.076(1.03)	0.083(1.12)	0.080(1.07)
Log-likelihood	-1451.931	-1452.654	-1452.329	-1453.162
LR chi2(26)	118.47	117.02	117.67	116.01
LR test α=0, chi2(1)	7.74	8.42	8.11	8.37
Vuong (z)	5.41	5.25	5.25	5.35

- *Note*: |t| are shown in parentheses. Regressions also included district and round dummies. Illiterate heads and spouses are the excluded educational categories. The likelihood ratio test is ZIP versus ZINB, where ZINB nests ZIP and α= is the dispersion/variance parameter.