Agricultural Policy, Schooling Participation and Child Labor in Developing Countries: Cotton Expansion in Burkina Faso

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1 Introduction

This paper uses policy reforms in Burkina Faso that opened up new regions to cotton farming to test the extent to which poor households reallocate child time between education and child labor in the face of a new production technology which modifies the returns to child labor. On the one hand, farmers who adopt cotton are more likely to enjoy a substantial income increase that should lead to an increased demand for education (Basu and Van, 1998; Behrman and Knowles, 1999; Edmonds, 2005). On the other hand, it is well documented that the productivity of child labor is relatively high in cotton (Collins and Margo, 2006; Levy, 1985). Levy (1985) reports that cotton weeding and picking are better suited to children than tasks connected with cultivating other crops and child labor does not have good substitutes in cotton-related work. Collins and Margo (2006) argues that the emphasis on cotton in the in the nineteenth century southern USA explains in part the education gap between Blacks and White since child labor was more productive in the cotton fields in the South, making children less likely to attend school.

2 The policy intervention: expansion of cotton farming

Cotton is one of the main economic resources of Burkina Faso. Although it represents less than 10 percent, it accounts for 50-60 percent of export earnings and is the main source of foreign exchange. In 1994 after the devaluation of the CFA Franc, the government launched a program to support cotton production. The objective consisted in extending cotton farming into new regions. The expansion concerned the central and eastern provinces of the country. As shown in figure 1, both harvest and acreage of cotton expanded substantially in these provinces after the mid 1990's. In contrast, the curves remain almost flat for the "non-cotton" region.

In figure 1, I use annual aggregate data from the ministry of agriculture. I use household level data collected in 1994, 1998 and 2003 to corroborate the trend observed with the aggregate data. I estimate the following regression.

$$y_{ht} = \alpha_1 + \alpha_2 X_{ht} + \alpha_3 CR_j + \beta_1 T^{1998} + \beta_2 T^{2003} + \gamma_1 CR_t T^{1998} + \gamma_2 CR_t T^{2003} + \epsilon ht \qquad (1)$$

Where h indexes the h^{th} household, and t indexes the years 1994, 1998 and 2003. The dependent variable (y) indicates whether a household reports farming cotton or not. The variable CR is a region dummy which is 1 for the "new cotton region" and 0 otherwise. X is a set of household and community characteristics. T^{1998} and T^{2003} are dummy variables which represent the post-reform period. The impact of the policy reform on cotton adoption is given by γ_1 and γ_2.

The regression results are shown in table 1. In column 1, the number of households who grow

cotton in the cotton expansion region increased by 6 percent between 1994 and 1998, and by 12 percent between 1994 and 2003. In column 3, I show that these estimates are robust to controlling for household characteristics and province level fixed effects. In columns 3-4 and 5-6, I replicate the same regressions for millet and sorghum, two of the most farmed food crops. The estimated coefficients indicate that that the policy reform did not have any significant effect on millet and sorghum.

Overall both the aggregate data and the household data indicate that after the policy reform, more households started growing cotton in the "new cotton" region.

3 Identification strategy

I use the policy reform to identify the effect of growing cotton on the enrollment and child labor for children in households who were induced by the reform to grow cotton. The main regressions I estimate are as follow:

$$y_{iht} = \alpha_0 + \alpha_1 Cotton_{ht} + \gamma_1 X_{iht} + \gamma_2 X_{ht} + \varepsilon_{iht} \tag{2}$$

where y is the outcome of interest (enrollment or child labor), Cotton is a dummy variable indicating whether a child's household adopted cotton, X_{iht} is a set child characteristics and X_{ht} is a set of household characteristics. In this regression, i indexes a child, h a household and t indexes time. I use CR_tT^{1998} and CR_tT^{2003} as defined in equation 1 to instrument for Cotton's adoption. The coefficient α_1 identifies the effect of farming cotton on the outcome of interest (enrollment or child labor) for those households in the new cotton region who have been induced to start farming cotton because of the policy change.

4 Results and Discussions

The estimations results are reported in tables– The preliminary results show that enrollment rates increased by 33 percent for girls (significant at 5 percent), but there was not significant effect on boys' enrollment. In contrast, boys were about 10 percent more likely to work than girls if their households adopted cotton. I am exploring three possible explanations. First, these results may reflect the argument that in low income settings, girls' human capital is a luxury and thus is more income-elastic than boys' human capital (e.g. Alderman and Gertler, 1997; Rosenzweig and Schultz, 1982). Second, it is plausible that farm work is divided along gender lines so that boys work more than girls on cotton fields. Third, in patrilineal where boys inherit land, the introduction of cotton (the most valuable cash crop) increases the value of bequest for boys (e.g. Quisumbing et al., 2001).

Parents may increase investment in girls' education if they are concerned about equality amongst their children (e.g. Fafchamps and Quisumbing, 2005). The full version of the paper will elaborate on these potential explanations.

References

Alderman, H. and P. Gertler (1997). Family resources and gender differences in human capital investments: The demand for childrens medical care in Pakistan. In L. Hadda, J. Hoddinott, and H. Alderman (Eds.), *Intrahousehold Resource Allocation in Developing Countries: Models, Methods and Policy*, pp. 231–248. The Johns Hopkins University Press.

Basu, K. and P. H. Van (1998). The economics of child labor. *American Economics Review 88*(3), 412–427.

Behrman, J. and J. Knowles (1999). Household income and child schooling in Vietnam. *The World Bank Economic Review 13*(2), 211–256.

Collins, W. J. and R. A. Margo (2006). Historical perspectives on racial differences in schooling in the United States. In E. Hanushek and F. Welch (Eds.), *Handbook of the Economics of Education*, Volume 1, pp. 107 – 154.

Edmonds, E. V. (2005). Does child labor decline with improving economic status? *Journal of Human Resources 40*(1), 77–99.

Fafchamps, M. and A. Quisumbing (2005). Marriage, bequest, and assortative matching in rural Ethiopia. *Economic Development and Cultural Change 53*(2), 347–380.

Levy, V. (1985). Cropping pattern, mechanization, child labor, and fertility behavior in a farming economy: Rural Egypt. *Economic Development and Cultural Change 33*(4), 777–791.

Quisumbing, A., E. Payongayong, J. Aidoo, and K. Otsuka (2001). Women's land rights in the transition to individualized ownership: implications for tree-resource management in Western Ghana. *Economic Development and Cultural Change 50*(1), 157–181.

Rosenzweig, M. and T. Schultz (1982). Market opportunities, genetic endowments, and intrafamily resource distribution: Child survival in rural India. *The American Economic Review 72*(4), 803–815.

Table 1: Impact of cotton expansion policy on crop choice

	(1)	(2)	(3)	(4)	(5)	(6)
	Cotton	Cotton	Millet	Millet	Sorghum	Sorghum
Year 1998	-0.020	0.076	-0.025	0.255	0.088	-0.051
	[0.006]***	[0.045]*	[0.024]	[0.394]	[0.035]**	[0.153]
Year 2003	-0.011	0.080	0.038	0.343	0.116	-0.034
	[0.007]	[0.040]**	[0.020]*	[0.394]	[0.030]***	[0.152]
New cotton region	-0.012		-0.017		0.064	
	[0.008]*		[0.028]		[0.035]*	
New cot. reg*1998	0.064	0.062	0.017	0.017	-0.039	0.017
	[0.020]***	[0.018]***	[0.043]	[0.039]	[0.049]	[0.037]
New cot. reg*2003	0.125	0.120	0.009	0.019	-0.045	-0.023
	[0.032]***	[0.026]***	[0.039]	[0.035]	[0.046]	[0.037]
		[0.000]		[0.000]		[0.000]
Head characteristics	no	yes	no	yes	no	yes
Household size	no	yes	no	yes	no	yes
Survey month	no	yes	no	yes	no	yes
Province fixed effects	no	yes	no	yes	no	yes
Constant	0.032	0.045	0.825	0.845	0.712	0.687
	[0.005]***	[0.019]**	[0.014]***	[0.047]***	[0.023]***	[0.047]***
F-Stat (Instruments)	9.12	11.19	0.39	0.3	0.03	0.34
Observations	10424	10424	10424	10424	10424	10424
R-squared	0.03	0.12	0.01	0.11	0.02	0.23

Standard errors in brackets

* significant at 10%; ** significant at 5%, *** significant at 1%

Table 2: Impact of cotton adoption on enrollment: IV estimation

	(1)	(2)	(3)	(4)	(5)	(6)
	Boys and Girls		Boys	Boys	Girls	Girls
Cotton	0.170	0.267	0.134	0.231	0.237	0.331
	[0.113]	[0.114]**	[0.176]	[0.173]	[0.139]*	[0.143]**
Girl	-0.102	-0.103				
	[0.006]***	[0.006]***				
year is 1998	-0.041	0.045	-0.056	0.110	-0.026	-0.005
	[0.007]***	[0.137]	[0.010]***	[0.188]	[0.009]***	[0.200]
year is 2003	0.007	0.101	0.009	0.187	0.003	0.027
	[0.008]	[0.137]	[0.012]	[0.187]	[0.011]	[0.200]
Child age	yes	yes	yes	yes	yes	yes
Education hh head	no	yes	no	yes	no	yes
Age hh head	no	yes	no	yes	no	yes
hh size	no	yes	no	yes	no	yes
Gender hh head	no	yes	no	yes	no	yes
Survey month	no	yes	no	yes	no	yes
Province fixed effects	yes	yes	yes	yes	yes	yes
Constant	0.129	-0.084	0.104	-0.142	0.054	-0.135
	[0.009]***	[0.039]**	[0.014]***	[0.058]**	[0.012]***	[0.050]***
Observations	17842	17842	9343	9343	8499	8499

Standard errors in brackets

* significant at 10%; ** significant at 5%, *** significant at 1%

Cotton is instrumented

Figure 1: Evolution of cotton production in new-cotton and non-cotton regions