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Credit Program Participation and Child Schooling in Rural Malawi

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Summary. — We evaluate the impact of agricultural credit program participation on children's school attendance in rural Malawi. Our paired-site sampling survey reveals that credit uptake decreased school attendance by young girl children. This finding raises concerns that young girl children are exploited as child labor, either at home or in the field, when working adults become more involved in income-generating activities financed by credit. The data, however, do not show clear evidence for young girls staying at home to do household chores or working in the fields in households that obtained credit, but instead find simultaneous occurrence between attending school and taking responsibilities for domestic chores by young children. It would appear, therefore, that credit uptake delays the realization of this concurrence among young girl children and leads to delayed school enrollment.

Key words — micro-credit, education, child labor, Sub-Saharan Africa, Malawi

1. INTRODUCTION

Microfinance institutions, and particularly micro-credit, have attracted much attention from development practitioners because of the potential that micro-credit and savings have for reducing poverty. By providing capital to limited-asset and low-income households for investing in agriculture or micro-enterprise development, household income is increased. This should result in increased expenditures on household needs and increased consumption for household members, including children's education (Armendariz & Morduch, 2005; Khandker, 2000). Micro-credit, however, could decrease the schooling levels of children because the labor demand on children is increased for either household production or chores as working-age adults are more involved in income-generating activities financed with credit (Morduch, 1999). Therefore, the impact evaluation of micro-credit programs on child schooling is an empirical question.

There seem to be several more possible pathways through which micro-credit influences the progress of human capital accumulation. Jacoby (1994), for example, studied the effect of borrowing constraints on the timing of human capital investment in Peru and found that higher family income and more durable-goods holdings enhance school progress in credit-constrained households but not in un-constrained households. His finding thus suggests that micro-credit, by relaxing household credit constraints, could improve school progress if loan services are delivered to constrained families. Wydick (1999), on the other hand, argues that the effect of credit access can be either positive or negative. His argument is that, if a relaxation of working capital constraints allows the family to substitute hired labor for the labor of children, a major effect of access to credit is positive. Yet, an opposite effect arises if the marginal product of family labor increases as a household enterprise becomes more heavily capitalized and raises the opportunity cost of schooling. His study in Guatemala shows that the latter effect is dominant and microenterprise lending has a negative effect on child schooling. Hazarika and Sarangi (2008) also examine the effect of the expansion of credit access, measured by self-assessed credit limits, on children's school attendance in rural Malawi. Their investigation shows that, while more access to credit leads to an increase in children's working hours, there is no significant impact on child schooling. Our study is similar to Hazarika and Sarangi's, however, we evaluate the effects of actual credit use, a more direct measure for investigating the impacts of micro-credit program on child schooling. In addition, by utilizing an original data set recently collected by a paired-site sampling survey in rural Malawi, we intend to add one more piece of evidence.

The importance of this study can be found in the context of child labor as well. In Sub-Saharan Africa, even young children are responsible for certain kinds of household chores such as cleaning, cooking, fetching water, and collecting firewood. Furthermore, child labor becomes more valuable as children become older because even children and adolescents can substitute for adult labor in agrarian economies; in Malawi, child labor is used in most of the tobacco cultivation chores such as watering, weeding, transplanting, and picking (Otañez, Muggli, Hurt, & Glantz, 2006). Family labor is a precious resource for poor households and labor allocation, including child schooling, is a critical decision for their subsistence.

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A series of theoretical studies investigates the determinants of child labor. Baland and Robinson (2000) show that, even when parents are altruistic, child labor is inefficient if (1) negative bequest is not allowed or (2) the capital market is imperfect. Ranjan (1999) also argues that poverty in combination with credit constraints can give rise to inefficient child labor. By developing an overlapping generations general equilibrium model, Ranjan (2001) shows how inefficient child labor arises due to credit constraints. These studies suggest that the expansion of access to credit reduces children's likelihood of being involved in child labor, and enhances investment in human capital. Empirically, with cross-country comparison, Dehejia and Gatti (2005) examine the role of financial development and income variability on child labor and conclude that the development of financial services, by reducing the income variability, decreases child labor. Ersado (2005) uses data from three counties to show that improving access to credit has a great potential to alleviate child labor and enhance school attendance in rural areas.

Another line of literature has investigated the trade-off between child labor and schooling by using household surveys in a specific country. Amin, Quayes, and Rives (2006) test if both market work and household work deter schooling in Bangladesh. Binder and Scrogin (1999) study the relationship between labor force participation and household work in Mexico. Ravallion and Wodon (2000) examine whether child labor displaces schooling in Bangladesh. Furthermore, Nankhuni and Findeis (2004) investigate how natural resource collection work adversely affects children's schooling in Malawi. Despite the enormous efforts on this issue, however, conclusions have been very controversial. Our study thus also contributes to this line of the literature.

The following section contains a description of the history and features of financial institutions in rural Malawi, particularly our target microfinance institution: Malawi Rural Financial Company. Section 3 addresses selection problems that confound program evaluation and explain how we treat such problems with our paired-site sampling survey design and econometric techniques. Section 4 provides our empirical results, and Section 5 summarizes the findings of this study and concludes our discussions.

2. RURAL CREDIT PROGRAMS IN MALAWI

Rural financial services in Malawi have been historically targeted to estates producing cash crops since before independence. Government policy after independence continued support of estate production and financed the development of tobacco estates. Marketing board surpluses were channeled as subsidized loans through banks to the estate sector (Kydd & Christiansen, 1982). By 1980, over 50% of commercial bank credit went to estates, mostly for burley tobacco production (Mkandawire & Phiri, 1987). Smallholders producing for local markets had little access to formal credit and were limited to informal lenders. A credit revolving fund established by the National Rural Development Programme in the early 1980s was reported to favor better-off farmers, rather than smallholders. Beginning in 1987, the Ministry of Agriculture offered agricultural production credit for hybrid maize to small farmers through the Smallholder Agricultural Credit Administration (SACA). Because of severe droughts and credit defaults in the early 1990s, SACA eventually collapsed.

In spite of financial liberalization policies[1] in the recent past, including increased participation of the private sector in banking, savings and lending services for the great majority of rural residents have not increased, and may have even decreased (Burritt, 2006). Few financial services in Malawi are licensed to accept savings, thus this service is very limited. The only formal savings institutions broadly available to rural residents are the Malawi Savings Bank and the Malawi Rural Finance Company. Credit cooperatives, such as SACCO and MUSCCO, service both rural and urban areas, and in the former areas loans are used for agricultural production and nonfarm micro-enterprises (Diagne & Zeller 2001).

Microfinance programs were introduced in the late 1980s, one of the earliest being the Malawi Mudzi Fund supported by IFAD and based on the Grameen model (Chirwa, 1998; Hulme, 1991). Other microfinance providers operated by NGOs and donor agencies in the last 15 years, such as Pride Malawi and FINCA, have attempted to service smallholder farmers, but they are dependent on commercial banks for payment services. Since commercial banks have reduced their presence in rural areas (Burritt, 2006), this constrains most rural microfinance providers.

Malawi Rural Finance Company (MRFC) is the largest rural financial institution providing agricultural and business loans to smallholder farmers in Malawi and the only microfinance provider with national coverage. MRFC took over the bankrupt Smallholder Agriculture Credit Administration (SACA) in 1993 with financial and technical assistance from the World Bank, and started its operation in 1994. MRFC inherited much of SACA's infrastructure consisting of rural extension service offices in the Extension Planning Areas (EPAs).[2] Since 1995, MRFC has absorbed other rural financial projects such as the Malawi Mudzi project, the Food Security Program, and Promotion of Microenterprises for Rural Women (PMERW supported by GTZ).

According to its 2004 annual report, MRFC has headquarters in the capital city Lilongwe, and has seven branch offices, 23 satellite offices, and 122 field offices all over the country. The total loan portfolio in 2003–04 was 1,329.9 million MK (about 10m US$) with 20,455 loan accounts and 170,840 loan customers (of which 68,366 were women). Loans for agricultural production totaled 1,001.7m MK and 328.2m MK for micro-enterprise activities; the average loan size was 7,252 MK (about 70 US$). While this microfinance institution accepts savings deposits, about 70% of these are really forced savings to collateralize loans (Burritt, 2006).

Agricultural production (seasonal) loans are provided mostly in kind, that is, seeds and/or fertilizer, while business loans are distributed in cash. In the mid-1990s, MRFC's agriculture production loans were made mainly for hybrid maize production; lately, however, MRFC targets farmers who produce cash crops such as tobacco, cotton, and groundnuts because these goods are more profitable than maize. Tobacco production, in particular, has become a major income source for smallholder farmers, although the recent downtrend of world tobacco prices is reducing profits from tobacco production.

MRFC provides two types of agricultural production credit: individual (called estate) and group (club) lending; the latter are considered micro-credit. In either case, cash and/or other types of collateral are required. Smallholder farmers without land titles are required to belong to clubs (credit groups) to participate in the program, and to assume collective liability for the total amount of loan that the group borrows from MRFC. Until recently, there was one MRFC field office in each EPA; in order to reduce operation costs the number of MRFC field offices has been decreasing and many field offices have become responsible for multiple EPAs. Each EPA is subdivided into several zones and the MRFC field officer visits

Table 1. *Sampled households*

Region District	Extension Planning Area	Program households	Non-program households	All households
North				
Rumphi	Mhuju	35	35	70
Mzimba	Zombwe	40	40	80
Central				
Ntcheu	Nsipe	49	49	98
Dedza	Mayani	50	50	100
South				
Blantyre	Lirangwe	25	50	75
Chiradzul	Mombezi	50	25	75
Total		249	249	498

Note: Extension Planning Area (EPA) is the administrative unit of agricultural extension services under the Ministry of Agriculture and Irrigation. In each EPA, there is one Malawi Rural Finance Company (MRFC) field officer who regularly visits program villages by motor cycle, and thus program households have access to credit from MRFC, whereas non-program households do not.

Table 2. *Household characteristics in program and non-program villages*

	Program	Non-program	Difference
All	($n = 249$)	($n = 249$)	
Age of head	46.0	43.8	2.1
% of female head	25.7	33.3	−7.6*
Male education[a]	5.13	5.12	0.01
Female education[b]	3.25	3.64	−0.39
Household size	4.96	4.73	0.23
Dependency ratio[c]	1.21	1.26	−0.05
Land size (acres)	4.67	4.03	0.65

Note: Un-weighted means are reported. More detailed comparison in each EPA is provided in Table 14.
Statistical differences between program and non-program villages are tested by *t*-test (two-sided).
* Significant at 10%.
** Significant at 5%.
*** Significant at 1%.
[a] Average of the highest grade completed by male head.
[b] Average of the highest grade completed by female head/spouse.
[c] Dependency ratio is defined as the ratio of the number of dependents (children under the age of 15 and adults above 65 years old) to that of working age adults. In 19 households the ratio cannot be calculated because there is no working adult.

Table 3. *Credit sources for borrowing over last 3 years*

	Program				Non-program			
	Borrower		Non-borrower		Borrower		Non-borrower	
Credit source	No.	%	No.	%	No.	%	No.	%
	($n = 248$)				($n = 248$)			
MRFC	107	(43.1)	141	(56.9)	11	(4.4)	237	(95.6)
Relatives/friends	98	(39.5)	150	(60.5)	105	(42.3)	143	(57.7)
Traders/shops	18	(7.3)	230	(92.7)	21	(8.5)	227	(91.5)

Note: 50 households obtained loans from both MRFC and relatives/friends, and 9 households borrowed from both MRFC and traders/shops; 7 households borrowed from all three credit sources.

each zone regularly and holds meetings with farmers to explain how to apply for and manage credit from MRFC. Field officers and community leaders collaborate to form credit clubs. When a club is created, its members are required to take a series of training sessions provided by MRFC before receiving any loans. This training ranges from mathematical exercises (such as calculating interest rates) to how to run a small business.

3. EMPIRICAL METHODOLOGY

The main objective of this study is to empirically evaluate the impact of credit program participation on children's school attendance and the likelihood of being involved in other productive activities. In the literature of program evaluation, the central issue is how to identify the average treatment effect of program participation. The identification of credit program impacts involves two types of selection biases: placement bias and self-selection bias (Pitt & Khandker, 1998). First, program placement was not random; program areas might be selected by MRFC on profitability basis, and thus families in program villages, on average, might be wealthier than those in non-program villages. Such differences in the underlying village-level characteristics lead us to an estimator with bias, called placement bias. Second, even within program areas, household decisions on participation in the credit program are non-random. Households with higher entrepreneurial capability, for example, are more likely to be a client of MRFC. If such unobservable characteristics are the real cause of the differences between program participants and non-participants rather than the program impact, the OLS[3] estimator suffers from omitted variable bias; this problem is known as self-selection bias. In order to consistently estimate the causal effect of the credit-program participation, we need to resolve these problems. The methodological approach we employ for these problems is a paired-site sampling survey design to construct a functional instrumental variable for program participation by creating a situation as if program placement had been unrelated to unobservable village characteristics.

(a) *Empirical model*

Before explaining our sampling design, we introduce the empirical model we estimate.

$$Y_i = X_i\beta_Y + D_i \cdot \Delta + \varepsilon_i^Y, \tag{1}$$

where Y_i is an outcome of individual i such as school attendance and participation in productive activities. The dependent variable takes the value of 1 if the child attends school or participates in child work and 0 otherwise; we also use an indicator for schooling progression.[4] X_i denotes a set of explanatory variables that determines the individual level outcome. D_i is a dummy variable that takes the value of 1 if individual i resides in a MRFC client household and 0 otherwise. Δ is the parameter of interest that represents the average

Table 4. *Total amount borrowed (over the last 3 years) in Malawi Kwacha*

Total amount	No.	Mean	Standard deviation
MRFC	118	32,359	34,001
Relatives/friends	203	3,945	8,595
Traders/shops	39	1,767	2,473

Note: 112 of 118 MRFC client households borrowed at least one group loan (seasonal) over the last 3 years and, of those, 3 households borrowed business loan as well. 2 households were individual loan (seasonal) clients and 4 households were business loan clients. There were 92 (89 seasonal) male clients and 34 (28 seasonal) female clients. Both male and female spouses were clients in 8 households.
1$ = 140 MK (Malawi Kwacha) at time of survey.

program effect, and a vector of parameters β_Y is also to be estimated along with the program effect Δ. ε_i^Y is an error term.

D_i is highly likely to be endogenous because of non-random program participation. The most popular approach to treat

Table 5. *Characteristics of MRFC clients and non-clients*

Variables	Program households			Non-program households
	Clients	Non-clients	All	All
Household characteristics	($n = 107$)	($n = 141$)	($n = 248$)	($n = 248$)
Age of head	47.0	45.0	45.9	43.7
% of female head	12.1***	36.2	25.8	33.5
Male education[a]	5.23	5.10	5.17	5.19
Female education[b]	3.45	3.15	3.28	3.66
Household size	5.37***	4.64	4.96	4.72
Dependency ratio[c]	1.05**	1.33	1.20	1.27
Land size (acres)	5.50**	4.02	4.65	4.08
Children's activities				
No. of children				
All	237	260	497	426
6–14 years old	164	208	372	336
15–18 years old	73	52	125	90
Schooling attendance ratio (%)				
All	89.9*	84.2	86.9	87.8
6–14 years old	90.9	88.0	89.2	92.9
15–18 years old	87.7**	69.2	80.0	68.9
Household chores[d] (%)				
All	24.1	27.3	25.8	34.7
6–14 years old	12.2***	22.6	18.0	28.6
15–18 years old	50.7	46.2	48.8	57.8
Crop farming[d] (%)				
All	18.6	21.2	19.9	17.4
6–14 years old	9.1**	17.8	14.0	13.4
15–18 years old	39.7	34.6	37.6	32.2

Note: Un-weighted means are reported. Statistical differences between clients and non-clients are tested by *t*-test (two-side).
* Significant at 10%.
** Significant at 5%.
*** Significant at 1%.
[a] Average of the highest grade completed by male head.
[b] Average of the highest grade completed by female head/spouse.
[c] Dependency ratio is defined as the ratio of the number of dependents (children under the age of 15 and adults above 65 years old) to that of working age adults. In 19 households the ratio cannot be calculated because there is no working adult.
[d] Percentage of those who are involved in household chores and crop farming. Household chores are cooking, washing, cleaning, fetching water, collecting firewood, buying food, and taking care of other family members such as young children, elderly, and sick persons.

Table 6. *Summary statistics of explanatory variables (n = 496)*

Explanatory variables	Mean	Standard deviation	Minimum	Maximum
MRFC participation				
MRFC client (=1)	0.238	(0.426)	0	1
Head and spouse characteristics				
Female headed household (=1)	0.296	(0.457)	0	1
Age	44.8	(15.9)	20	92
Highest education (grade) completed by male head	5.18	(3.64)	0	14
Highest education (grade) completed by female head/spouse	3.47	(3.30)	0	12
Household characteristics				
log (household size)	1.471	(0.486)	0	2.398
Ratio of dependents (15− and 65+) to household size	0.491	(0.229)	0	1
Log (land size in acre)	1.216	(0.626)	−0.693	4.305
Village characteristics				
Program (=1)	0.500	(0.501)	0	1
North (=1)	0.300	(0.459)	0	1
Central (=1)	0.397	(0.490)	0	1
South (=1)	0.302	(0.460)	0	1

Table 7. *Determinants of MRFC credit use [Probit model]*

Household and individual characteristics	Program area households	Non-program area households	All households
	(A)	(B)	(C)
Head and spouse characteristics			
Female headed household (=1)	−0.428***	0.006	−0.146***
	(0.115)	(0.039)	(0.054)
Age of household head	0.042**	0.001	0.017**
	(0.018)	(0.003)	(0.008)
Age squared	−0.386**	0.005**	−0.150**
[×10^{-3}]	(0.180)	(0.033)	(0.079)
Highest education (grade) completed by male head	−0.006	−0.003	−0.007
	(0.015)	(0.003)	(0.007)
Highest education (grade) completed by female head/spouse	0.024	−0.001	0.008
	(0.015)	(0.003)	(0.007)
Household characteristics			
log (household size)	0.096	0.037	0.079*
	(0.098)	(0.025)	(0.045)
Ratio of dependents (15− and 65+) to household size	−0.299	0.015	−0.117
	(0.187)	(0.038)	(0.084)
log (land size in acres)	0.068	−0.003	0.034
	(0.064)	(0.017)	(0.031)
Program (=1)			0.368***
			(0.035)
Central (=1)	−0.111	−0.027	−0.077
	(0.108)	(0.022)	(0.048)
South (=1)	0.275**	−0.006	0.118*
	(0.110)	(0.022)	(0.064)
Sample size	248	248	496
Pseudo *R*-squared	0.20	0.20	0.34
Log-likelihood	−135.84	−36.06	−178.47

Note: Marginal effects evaluated at mean values are reported and standard errors in parentheses.
A joint test shows that the coefficients on all explanatory variables for non-program area households are not jointly different from those for program area households.
* Significant at 10%.
** Significant at 5%.
*** Significant at 1%.

this problem is the 2SLS[5] procedure by using an instrumental variable, Z. In the first stage of 2SLS, the following participation equation is considered.

$$D_i = X_i\beta_D + Z_i \cdot \gamma + \varepsilon_i^D, \quad (2)$$

where a vector of parameters β_D and γ are to be estimated, and ε_i^D is an error term. Eqn. (2) is estimated by OLS, and we can obtain the predicted value of $\hat{D}_i$ by utilizing the estimated value of $\hat{\beta}_D$ and $\hat{\gamma}$. Then, Eqn. (1) is estimated with $\hat{D}_i$ instead of D_i in the second stage. This 2SLS procedure provides us with a consistent estimator for the program effect (Δ).

(b) *Sampling strategy*

The conditions for valid instrumental variables are the following. First, instrumental variables have to be associated with program participation decisions. Second, instrumental variables *per se* should have no association with the outcomes, but if they do, the impact is only through credit program participation. In other words, instrumental variables must influence household credit decisions, but have to be independent of household decisions on children's time allocation. Ideally, households would be randomly assigned to the program. Yet, program assignment was not random in rural Malawi, and finding valid instrumental variables is often difficult. Therefore, we employed a paired-site sampling survey design to make program placement in our sample the valid instrumental variable.

Since credit use is extremely low in Malawi and widely scattered, we purposefully selected program sample rural sites in each of the three regions[6] with high MRFC borrower levels to ensure a high proportion of households with borrowers. Second, nearby villages without access to formal credit (i.e., non-program villages) were also purposefully selected as control areas. Since placement of program has been determined by communications between MRFC field officers and village

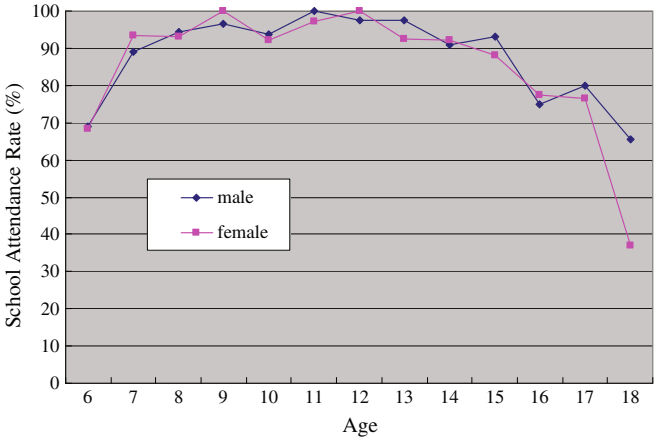

Figure 1. *School attendance rate by age and gender.*

leaders, some villages close to the program villages do not have program access due to insufficient communications and/or conflicts between MRFC field officers and village leaders. Third, a population census was carried out in each selected program and non-program village, and the list of households drawn up. Finally, sampled households were randomly selected from the list and then interviewed. All these procedures were conducted during August and September 2006. Note that, because areas were purposefully selected, the sample is not representative of Malawi nationally. Table 1 shows the number of sampled households by region. The total number of sampled households is 498: 150 in the north, 198 in the central, and 150 in the south regions.

In this survey sampling design, we attempted to minimize differences in the underlying household- and village-level characteristics (both observable and unobservable) between program and non-program communities so that we can utilize program placement in our sample as an instrumental variable. In order to confirm this, Table 2 compares some observable household characteristics between program and non-program communities. Most household characteristics do not show any significant differences (more detailed comparison is found in Table 14). We thus conclude that the differences between program and non-program communities in our sample are negligible, implying that program placement itself is independent of children's school attendance, productive activities, and other unobservable characteristics, although it is not entirely flawless. [7]

Borrowing behavior in our sample shows expected differences between program and non-program communities (Table 3): there is a high number of MRFC borrowers in the program areas and a low number in non-program areas. [8] In addition, many households in our sample in both program and non-program areas borrowed from relatives and friends, very few from traders and shops. Not only does MRFC provide another source of credit in the program areas, the average amount borrowed per household over the last three years (32,359 Malawi Kwacha) is, on average, about 8 times the amount borrowed from relatives and friends (3,945 MK) and more than 18 times the amount borrowed from traders

Table 8. *Impact of credit use on school attendance [linear probability model]*

	Children aged 6–14		Adolescents aged 15–18	
	OLS	2SLS	OLS	2SLS
	(A)	(B)	(C)	(D)
Credit use				
MRFC client (=1)	−0.008	−0.116*	0.089	0.133
	(0.025)	(0.060)	(0.059)	(0.103)
Child characteristics				
Female (=1)	0.005	0.002	−0.106**	−0.106*
	(0.021)	(0.021)	(0.054)	(0.054)
Age of child	0.236***	0.231***	−0.144	−0.212
	(0.034)	(0.034)	(0.893)	(0.904)
Age squared	−0.011***	−0.010***	0.001	0.003
	(0.002)	(0.002)	(0.027)	(0.027)
Head and spouse characteristics				
Female headed household (=1)	−0.069	−0.089**	−0.352***	−0.339***
	(0.043)	(0.045)	(0.118)	(0.120)
Age of household head	0.006	0.008	0.025**	0.024*
	(0.005)	(0.005)	(0.012)	(0.013)
Age squared	−0.054	−0.063	−0.208*	−0.200*
$[\times 10^{-3}]$	(0.052)	(0.053)	(0.118)	(0.119)
Highest education (grade) completed by male head	0.004	0.002	−0.003	−0.003
	(0.005)	(0.005)	(0.012)	(0.012)
Highest education (grade) completed by female head/spouse	0.009**	0.009**	0.021*	0.021*
	(0.005)	(0.005)	(0.011)	(0.012)
Household characteristics				
log (household size)	−0.034	−0.034	−0.040	−0.040
	(0.035)	(0.036)	(0.099)	(0.099)
Ratio of dependents (15− and 65+) to household size	−0.010	−0.024	0.403**	0.406**
	(0.076)	(0.077)	(0.177)	(0.178)
Log (land size in acres)	−0.025	−0.020	0.063	0.056
	(0.020)	(0.020)	(0.052)	(0.054)
Central (=1)	−0.120***	−0.129***	−0.101	−0.107
	(0.033)	(0.034)	(0.087)	(0.088)
South (=1)	−0.099***	−0.085**	0.103	0.092
	(0.034)	(0.036)	(0.091)	(0.094)
Sample size	708	708	215	215
R-squared	0.14	0.12	0.31	0.30

Note: Standard errors in parentheses.
* Significant at 10%.
** Significant at 5%.
*** Significant at 1%.

and shops (1,767 MK) (see Table 4). Because we targeted districts and EPAs with relatively high numbers of micro-credit borrowers, the number of borrowers in our program sample areas is very high compared to national coverage: almost 43% of households in program villages had obtained at least one loan from MRFC during the last three years.[9] The great majority of MRFC loans are for agricultural production, so we are evaluating the impact of agricultural credit.

(c) *Descriptive analysis*

Table 5 shows the characteristics of the MRFC clients and non-clients in our sample. Most MRFC clients are two-spouse households, indicating that female-headed households are less likely to be clients. Larger households and households with fewer dependents are more likely to be a client. These findings imply that households with relatively more adult family labor are more likely to be clients because MRFC loans stimulate agricultural production. Interestingly, non-client households in program villages have similar characteristics with those in non-program villages. In the program villages, the total number of children aged 6–18 in MRFC client households is 237 (2.2 per household) and the number of those in non-client households is 260 (1.8 per household). The school attendance ratio for children from MRFC client households is slightly higher than that for children from non-client households among young children (aged 6–14), and such differences are even more apparent among adolescents (aged 15–18). When it comes to children's productive activities, on the other hand, children from MRFC clients are less likely to participation in domestic chores and crop farming. Thus, credit program participation is positively correlated with school attendance, and negatively correlated with child labor. Possible explanations are that client households have more adult labor and, if land size is any indicator, possibly wealthier.

In the following section, we examine these preliminary findings with multivariable regression analyses and test whether these correlations can be explained by the program effect. For the regression analyses, the summary statistics of explanatory variables are shown in Table 6. Overall, 23.8% of the households in both program and non-program areas are MRFC clients, and only 6.9% are female clients. About 30% are female-headed households, and the average age of household head is 44.8 years old. The mean household size is 4.8 and

Table 9. *Impact of credit use on school attendance among children aged 6–14 [linear probability model]*

	Boys		Girls	
	OLS	2SLS	OLS	2SLS
	(A)	(B)	(C)	(D)
Credit use				
MRFC client (=1)	0.047	−0.066	−0.070*	−0.157*
	(0.035)	(0.077)	(0.036)	(0.094)
Child characteristics				
Age of child	0.214***	0.217***	0.262***	0.251***
	(0.049)	(0.050)	(0.047)	(0.049)
Age squared	−0.010***	−0.010***	−0.012***	−0.011***
	(0.002)	(0.002)	(0.002)	(0.002)
Head and spouse characteristics				
Female headed household (=1)	−0.095	−0.115*	−0.066	−0.082
	(0.064)	(0.066)	(0.059)	(0.061)
Age of household head	0.012	0.014*	0.001	0.002
	(0.007)	(0.008)	(0.008)	(0.008)
Age squared	−0.102	−0.117	−0.009	−0.016
[$\times 10^{-3}$]	(0.072)	(0.073)	(0.078)	(0.079)
Highest education (grade) completed by male head	0.002	−0.001	0.007	0.006
	(0.006)	(0.007)	(0.006)	(0.007)
Highest education (grade) completed by female head/spouse	0.008	0.009	0.011*	0.012*
	(0.006)	(0.006)	(0.006)	(0.007)
Household characteristics				
log (household size)	−0.064	−0.065	−0.020	−0.023
	(0.050)	(0.051)	(0.050)	(0.051)
Ratio of dependents (15− and 65+) to household size	0.153	0.128	−0.142	−0.145
	(0.116)	(0.119)	(0.102)	(0.103)
log (land size in acres)	0.002	0.008	−0.054*	−0.047
	(0.026)	(0.026)	(0.032)	(0.033)
Central (=1)	−0.115**	−0.129***	−0.111**	−0.114**
	(0.048)	(0.049)	(0.046)	(0.047)
South (=1)	−0.067	−0.054	−0.132***	−0.119**
	(0.048)	(0.050)	(0.050)	(0.052)
Sample size	345	345	363	363
R-squared	0.15	0.12	0.18	0.17

Note: Standard errors in parentheses.
* Significant at 10%.
** Significant at 5%.
*** Significant at 1%.

the ratio of dependents suggests that nearly half of the sampled individuals are dependents. [10] Households own an average of 4.2 acres of land including residential land.

4. REGRESSION RESULTS

(a) *MRFC program participation*

We first investigate the observable characteristics of those individuals and households that are more likely to participate in the credit program (Table 7). Using the whole sample (Column C), the Probit estimation shows that being a female-headed household has a negative and significant coefficient (5% level) indicating that women who head households (and are single) are 14.6% less likely to participate in the credit program. Age of household head and its squared term have positive and significant coefficients (5% level) indicating that the probability of participating in the credit program peaks at age of 55.9. Household size is also a positive and significant determinant (5% level). Larger households are more likely to obtain a loan from the credit program. Finally, as expected, living in a program area has a highly significant positive coefficient for participation, which means that the program village dummy variable satisfies one of the requirements for the instrumental variable. The pseudo R squared of the estimation of participation equation is 0.343.

(b) *School outcome*

The first hypothesis we attempt to test is whether actual credit use has positive effects on children's school attendance. [11] Since our survey was carried out during the school vacation break, school attendance was measured by the regular school attendance of the child at the end of the last academic semester. Children in Malawi, especially in rural areas, tend to repeat grade levels, and for this reason older children may still be attending primary school. In our sample, over half of the 6-year old children were attending school, and by age 7 the great majority was in school. Attendance seems to peak at age 12, and then declines steadily as children become older. Because secondary school is not free, children that complete primary often do not go on to secondary school. Figure 1 shows school attendance ratios by gender

Table 10. *Impact of credit use on school attendance among adolescents aged 15–18 [linear probability model]*

	Boys		Girls	
	OLS	2SLS	OLS	2SLS
	(A)	(B)	(C)	(D)
Credit use				
MRFC client (=1)	0.123	0.071	0.012	0.121
	(0.079)	(0.132)	(0.090)	(0.156)
Child characteristics				
Age of child	−1.520	−1.353	0.721	0.794
	(1.269)	(1.318)	(1.327)	(1.341)
Age squared	0.044	0.039	−0.026	−0.029
	(0.039)	(0.040)	(0.040)	(0.041)
Head and spouse characteristics				
Female headed household (=1)	−0.324*	−0.351*	−0.370**	−0.343*
	(0.171)	(0.180)	(0.181)	(0.185)
Age of household head	0.001	0.003	0.025	0.024
	(0.022)	(0.023)	(0.017)	(0.017)
Age squared	−0.022	−0.042	−0.168	−0.157
[$\times 10^{-3}$]	(0.202)	(0.206)	(0.166)	(0.168)
Highest education (grade) completed by male head	0.013	0.013	−0.029	−0.024
	(0.015)	(0.015)	(0.019)	(0.020)
Highest education (grade) completed by female head/spouse	0.011	0.011	0.032**	0.033**
	(0.016)	(0.016)	(0.016)	(0.016)
Household characteristics				
log (household size)	−0.031	−0.034	−0.083	−0.083
	(0.142)	(0.143)	(0.144)	(0.145)
Ratio of dependents (15− and 65+) to household size	0.423	0.426	0.381	0.383
	(0.258)	(0.258)	(0.261)	(0.263)
Log (land size in acres)	0.032	0.040	0.018	−0.005
	(0.073)	(0.075)	(0.076)	(0.081)
Central (=1)	−0.114	−0.100	−0.262*	−0.248*
	(0.118)	(0.122)	(0.138)	(0.140)
South (=1)	0.027	0.048	−0.016	−0.024
	(0.130)	(0.137)	(0.142)	(0.144)
Sample size	115	115	100	100
R-squared	0.27	0.27	0.46	0.45

Note: Standard errors in parentheses.
* Significant at 10%.
** Significant at 5%.
*** Significant at 1%.

and age groups: attendance rates for the whole sample are lower for older children, and lower for older girl children compared to older boy children, revealing that gender differences are larger and more evident at higher ages. While differences in school attendance ratios between borrowers and non-borrows are very small for young children, older children from borrower family are more likely to still be in school (Table 5). We will examine this tendency more closely using regression analysis.

Table 8 shows the effect of MRFC credit use on individual children's school attendance among primary-age children (aged 6–14) and secondary-age children (aged 15–18).[12] The 2SLS estimation shows that credit use decreased school attendance by 11.6% points (significant at 10% level) for primary-age children (Column B), whereas there was no significant effect for secondary-age children (Column D). Another factor that affects child schooling is age and its squared term for young children suggesting that the peak of the school attendance is 11.0 years old. Younger children from female headed households are less likely to attend school by 8.9%-points (significant at 5% level) and adolescents by 33.9%-points (significant at 1% level). Age of the household head affects schooling only for adolescents: adolescents are most likely to attend school when the head is 61 years old. While male heads' education does not have any impact, female heads' and spouses' education positively influences all children. One more year of educational attainment leads to a 0.9%-point increase in school attendance ratio for younger children and 2.1%-point increase for adolescents. Positive coefficients (significant at 5% level) on the ratio of dependents may be counterintuitive, but larger ratios probably suggest the presence of more family labor supply by younger children to support the continuation of adolescents' schooling.

If we break down our sample of school children by gender to explore the effect on boy and girl children separately, the differences between age groups become more evident. For primary-age children (Table 9, columns B and D), the negative effect we detected seems to be borne mainly by girls—their attendance rate decreases by almost 16% points (significant at 10% level) while the effect is insignificant for boys. For secondary-age children (Table 10, columns B and D), on the other hand, the effect is insignificant for both boys and girls. We further investigate the impact of program participation on children's schooling progression (Table 11). We found that credit uptake resulted in slower educational progression for both boys and girls. Thus, program participation seems to lead to frequent grade repetition for young boy children and delayed enrollment for young girl children.

Table 11. *Impact of credit use on educational progression*[a] *among children aged 6–14 [Tobit model]*

	Boys		Girls	
	Tobit	IV Tobit	Tobit	IV Tobit
	(A)	(B)	(C)	(D)
MRFC participation				
MRFC client (=1)	0.016	−0.176*	0.028	−0.277*
	(0.043)	(0.098)	(0.062)	(0.164)
Child characteristics				
Age dummies	Included	Included	Included	Included
Head and spouse characteristics				
Female headed household (=1)	0.027	−0.005	−0.115	−0.173
	(0.080)	(0.089)	(0.100)	(0.108)
Age of household head	0.014	0.020*	0.014	0.018
	(0.009)	(0.010)	(0.014)	(0.014)
Age squared [$\times 10^{-3}$]	−0.111	−0.153	−0.097	−0.128
	(0.089)	(0.099)	(0.135)	(0.140)
Highest education (grade) completed by male head	0.013*	−0.014	0.020*	−0.008
	(0.008)	(0.009)	(0.011)	(0.009)
Highest education (grade) completed by female head/spouse	0.014*	0.015*	0.022*	0.023**
	(0.008)	(0.008)	(0.011)	(0.011)
Household characteristics				
log (household size)	−0.077	−0.092	−0.066	−0.065
	(0.062)	(0.070)	(0.086)	(0.067)
Ratio of dependents (15− and 65+) to household size	0.011	−0.030	−0.232	−0.009
	(0.144)	(0.149)	(0.176)	(0.182)
Log (land size in acres)	0.006	0.027	−0.055	0.066
	(0.032)	(0.036)	(0.054)	(0.057)
Central (=1)	−0.273***	−0.296***	−0.223***	−0.236***
	(0.059)	(0.061)	(0.078)	(0.081)
South (=1)	−0.134**	0.107	−0.234***	0.113*
	(0.059)	(0.062)	(0.085)	(0.066)
Sample size	345	345	363	363
Log likelihood	−131.5	−270.9	−249.0	−388.3

Note: Standard errors in parentheses.
* Significant at 10%.
** Significant at 5%.
*** Significant at 1%.
[a] Dependent variable is (the highest grade attained)/(age − 5)

(c) *Child work*

The next line of analysis is the effects of MRFC credit use on other types of children's activities. Because children's participation in wage employment and non-farm self-business is rare in our sample, this study focuses on their participation in agricultural production and household domestic chores. Table 12 shows the impact on children's participation in agricultural production. Although the credit uptake coefficients are positive, they are not significant (Columns B and D). These non-significant coefficients, however, may suffer from larger measurement errors. Hazarika and Sarangi (2008) find that the expansion of credit access raises the probability of child work in the peak season of labor demand. By contrast, our survey was conducted after the agricultural harvest season (not in the peak season) and the information about crop farming was retrospective. Therefore, children's agricultural work in the peak season might be underreported due to poor memory, and children's participation in agricultural production may be one explanation for non-attendance to school.

Other factors that have an influence on young children's participation in crop farming are female headship, level of education completed by female spouse, and land size (Columns A and B). In female-headed households, young children are less likely to participate in crop farming. Higher female education reduces the probability of child work in crop farming, whereas larger landholdings require more child labor. Age and family structure do not matter among younger children. For adolescents, on the other hand, most explanatory variables are not statistically significant and the low *R*-squared value indicates that the explanation power of these regression analyses is weak.

Table 13 shows the impact on children's participation in household chores. There is strong evidence that credit uptake reduced the probability of children's participation in household chores (Column B). The findings that credit use decreases the probabilities of both children's school attendance and household chores seem to be contradictory. Yet, past studies that examine whether or not child labor deters school attendance have provided very controversial evidence. Nankhuni

Table 12. *Impact of credit use on crop farming [linear probability model]*

	Children aged 6–14		Adolescents aged 15–18	
	OLS	2SLS	OLS	2SLS
	(A)	(B)	(C)	(D)
Credit use				
MRFC client (=1)	−0.075**	0.017	0.082	0.072
	(0.030)	(0.072)	(0.075)	(0.131)
Child characteristics				
Female (=1)	−0.035	−0.032	−0.077	−0.078
	(0.025)	(0.025)	(0.068)	(0.068)
Age of child	−0.021	−0.017	0.612	0.629
	(0.041)	(0.041)	(1.140)	(1.152)
Age squared	0.003	0.002	−0.017	−0.018
	(0.002)	(0.002)	(0.035)	(0.035)
Head and spouse characteristics				
Female headed household (=1)	−0.121**	−0.104*	−0.150	−0.153
	(0.052)	(0.054)	(0.150)	(0.154)
Age of household head	−0.009	−0.010	−0.003	−0.003
	(0.006)	(0.007)	(0.016)	(0.016)
Age squared	0.049	0.057	0.016*	0.014*
$[\times 10^{-3}]$	(0.064)	(0.064)	(0.150)	(0.152)
Highest education (grade) completed by male spouse	0.003	0.005	−0.010	−0.010
	(0.005)	(0.006)	(0.015)	(0.015)
Highest education (grade) completed by female spouse	−0.009*	−0.010*	−0.004	−0.004
	(0.005)	(0.006)	(0.015)	(0.015)
Household characteristics				
log (household size)	−0.020	−0.020	0.155	0.155
	(0.043)	(0.043)	(0.126)	(0.126)
Ratio of dependents (15− and 65+) to household size	−0.027	−0.015	0.080	0.079
	(0.092)	(0.093)	(0.226)	(0.226)
Log (land size in acres)	0.053**	0.048**	0.085	0.087
	(0.024)	(0.024)	(0.066)	(0.068)
Central (=1)	−0.148***	−0.141***	0.048	0.049
	(0.040)	(0.041)	(0.111)	(0.112)
South (=1)	−0.129***	−0.140***	0.058	0.060
	(0.042)	(0.043)	(0.117)	(0.120)
Sample size	708	708	215	215
R-squared	0.12	0.11	0.08	0.08

Note: Standard errors in parentheses.
* Significant at 10%.
** Significant at 5%.
*** Significant at 1%.

and Findeis (2004), for example, find that girls are more likely to attend school and conduct resource-collecting work than boys, which implies that child schooling and domestic work are not necessarily competing.[13] In rural Malawi, their findings may reflect the fact that young girl children who mature earlier than boys are more likely to attend school and more likely to be responsible for domestic work. An alternative explanation is that schooling experiences through socialization may enhance children to become more responsible for domestic chores. Young children in contrast may not be able to do any responsible work without appropriate instructions from parents. If parents become more involved in their credit-stimulated agricultural production, young children are more likely to be involved in agricultural production during the peak season and, during off-peak season, are "idle" children who neither attend school nor work.

Edmonds (2008) articulates this question as a "puzzle of idle children." It would seem that there is a certain proportion of "idle" children in our sample. He argues that there are two possible explanations for this. One is due to the difficulties of accurately capturing children's activities by household surveys, and he admits that controversial findings are attributable to measurement errors. The other explanation is that such decisions concerning children's time allocation can be a result of rational household behavior. Households may highly evaluate children's leisure time or children's work may be more destructive than productive. In such a case, the decision that households do not send children to school and do not let them work can be a rational decision.

5. CONCLUSIONS

We evaluate the impact of agricultural credit program participation on children's school attendance in rural Malawi. Our paired-site sampling survey reveals that credit uptake has decreased school attendance by young girl children. Because tobacco production is labor intensive, more family labor is needed for agricultural production necessitating the participation of women family members (Peters, 2006). Girl children

Table 13. *Impact of credit use on household chores [linear probability model]*

	Children aged 6–14		Adolescents aged 15–18	
	OLS	2SLS	OLS	2SLS
	(A)	(B)	(C)	(D)
Credit use				
MRFC client (=1)	−0.082**	−0.233***	−0.019	−0.197
	(0.035)	(0.084)	(0.071)	(0.126)
Child characteristics				
Female (=1)	0.142***	0.138***	0.319***	0.317***
	(0.029)	(0.029)	(0.065)	(0.066)
Age of child	−0.003	−0.011	0.238	0.510
	(0.047)	(0.048)	(1.076)	(1.104)
Age squared	0.003	0.003	−0.006	−0.014
	(0.002)	(0.002)	(0.033)	(0.033)
Head and spouse characteristics				
Female headed household (=1)	−0.052	−0.080	0.193	0.141
	(0.061)	(0.063)	(0.142)	(0.147)
Age of household head	−0.005	−0.003	0.012	0.016
	(0.008)	(0.008)	(0.015)	(0.015)
Age squared	0.055	0.043	−0.139*	−0.171*
[$\times 10^{-3}$]	(0.074)	(0.075)	(0.142)	(0.145)
Highest education (grade) completed by male head	0.001	−0.003	0.026*	0.025*
	(0.006)	(0.007)	(0.014)	(0.014)
Highest education (grade) completed by female head/spouse	0.001	0.01	−0.033**	−0.036**
	(0.006)	(0.006)	(0.014)	(0.014)
Household characteristics				
log (household size)	−0.225***	−0.226***	−0.521***	−0.518***
	(0.049)	(0.050)	(0.119)	(0.121)
Ratio of dependents (15− and 65+) to household size	0.410***	0.391***	0.720***	0.706***
	(0.107)	(0.109)	(0.213)	(0.217)
Log (land size in acres)	−0.002	0.006	0.050	0.077
	(0.028)	(0.028)	(0.063)	(0.066)
Central (=1)	0.011	−0.001	−0.336***	−0.314***
	(0.046)	(0.047)	(0.105)	(0.107)
South (=1)	−0.038	−0.019	−0.132	−0.088
	(0.049)	(0.050)	(0.110)	(0.115)
Sample size	708	708	215	215
R-squared	0.21	0.19	0.25	0.22

Note: Standard errors in parentheses.
* Significant at 10%.
** Significant at 5%.
*** Significant at 1%.

Table 14. *Household and community characteristics by Extension Planning Area (EPA)*

Region	Name of EPA			Name of EPA		
	Program	Non-program	Total	Program	Non-program	Total
North		Mhuju			Zombwe	
Household characteristics	($n = 35$)	($n = 35$)	($n = 70$)	($n = 39$)	($n = 40$)	($n = 79$)
Age of head	43.5	38.3	40.9	45.4	49.0	47.2
% of female head	5.7	2.9	4.3	17.9	22.5	20.3
Male education[a]	7.31	6.38	6.90	5.55	6.64	6.16
Female education[b]	1.31	1.21	1.26	1.23	1.18	1.21
Household size	5.63	5.14	5.39	5.95	5.53	5.73
Dependency ratio[c]	1.31	1.21	1.26	1.23	1.18	1.21
Land size (acres)	6.74	5.10	5.92	7.51	6.39	6.94
Community characteristics[d]						
Population (household)	74	57	131	84	121	205
Major ethnic groups		Tumbuka and Chewa			Tumbuka	
Market access	0 km	2 km	1 km		4 km	
Primary school (gov.)	5 km	10 km	7.5 km		15 km	
Primary school (private)		In community			In community	
Secondary school (gov.)		In community			In community	
Secondary school (private)		N.A.			N.A.	
Central		Nsipe			Mayani	
Household characteristics	($n = 49$)	($n = 49$)	($n = 98$)	($n = 50$)	($n = 49$)	($n = 99$)
Age of head	46.4	44.6	45.5	43.3	41.7	42.5
% of female head	49.0	38.8	43.9	28.0	57.1***	42.4
Male education[a]	5.46	6.24	5.89	4.00	3.14	3.68
Female education[b]	3.31	4.57**	3.94	2.32	2.47**	2.39
Household size	4.24	4.22	4.23	4.98	4.27	4.63
Dependency ratio[c]	1.07	1.15	1.11	1.30	1.59	1.45
Land size (acres)	3.66	3.49	3.58	3.94	3.87	3.90
Community characteristics[d]						
Population (household)	128	263	391	163	144	307
Major ethnic groups		Ngoni			Yao and Chewa	
Market access		1.6 km		10 km	3 km	6.5 km
Primary school (gov.)		In community		5 km	2 km	3.5 km
Primary school (private)		N.A.			N.A.	
Secondary school (gov.)		15 km		10 km	3 km	4 km
Secondary school (private)		In community			N.A.	
South		Lirange			Mombezi	
Household characteristics	($n = 25$)	($n = 50$)	($n = 75$)	($n = 50$)	($n = 25$)	($n = 75$)
Age of head	48.0	44.7	45.8	48.9	43.0	46.9
% of female head	40.0	42.0	41.3	14.0	20.0	16.0
Male education[a]	5.40	6.07	5.83	4.98	2.85**	4.27
Female education[b]	3.02	3.76	3.52	3.11	2.88	3.03
Household size	4.44	4.92	4.76	4.64	4.28	4.52
Dependency ratio[c]	1.53	1.33	1.39	0.98	0.99	0.98
Land size (acres)	2.88	2.82	2.84	3.55	3.06	3.39
Community characteristics[d]						
Population (household)	92	421	513	417	48	465
Major ethnic groups		Yao and Chewa			Lomwe	
Market access		3 km		5 km	5 km	5 km
Primary school (gov.)		In community		2 km	5 km	3.5 km
Primary school (private)		N.A.			N.A.	
Secondary school (gov.)		In community		8 km	3 km	5.5 km
Secondary school (private)		N.A.			N.A.	

Note: Un-weighted means are reported. Statistical differences between program and non-program villages in each EPA are tested by *t*-test (two-sided).

* Significant at 10%.

** Significant at 5%.

*** Significant at 1%.

[a] Average of the highest grade completed by male head.

[b] Average of the highest grade completed by female head/spouse.

[c] Dependency ratio is defined as the ratio of the number of dependents (children under the age of 15 and adults above 65 years old) to that of working age adults. In 19 households the ratio cannot be calculated because there is no working adult.

[d] Two independent community surveys were conducted in Muhuju, Mayani and Mombezi EPAs, whereas only one was conducted in Zombwe, Nsipe and Lirange because in the later EPAs both program and non-program villages belong to the same community (multiple villages in some areas constitute one community that has clear boundaries). The following characteristics are common in all sample communities.

1. Major religions are Christianity, Islam and traditional belief.
2. Main economic activities are farming and small businesses such as handicraft.
3. The type of road that leads to the community is maintained dirt road.

may be taking over the domestic chores of adult women as the latter become more involved in income-generating activities financed by credit. Our empirical study, however, does not show clear evidence for such a conjecture. This study instead finds simultaneous occurrence between attending school and taking responsibilities for household domestic chores by young children. It would appear, therefore, that credit uptake delays the realization of this concurrence among young girl children and leads to their delayed enrollment in school. Children from MRFC client families are more likely to remain as "idle" children particularly in the agricultural off-season, whereas such children may be more involved in agricultural production in the peak-season as Hazarika and Sarangi (2008) suggest. [14] This finding also corresponds to that of Wydick (1999) who found that household enterprise capitalization raises the marginal product of child labor and thus children's opportunity cost, which results in a decrease in children's school attendance. In summary, our study contributes to the literature that demonstrates that credit access does not unequivocally lead to more schooling for children, particularly for girl children.

The second issue is that financial services do not seem to reach the poorest. In this study, we investigated the household characteristics that determine the credit program participation, and found that smaller households, particularly female-headed households, are less likely to participate in the program. Since such households are most likely to be the poorest, the credit program seems to fail in delivering financial services to the poorest. In rural Malawi, smaller household size implies that there is insufficient family labor force for micro-credit stimulated activities with imperfect labor markets in the regions. [15] These findings collectively suggest that, by paying more attention to family labor allocation along with credit program participation, the current credit program has room for modifications to disseminate their services to the poorest and to eliminate its negative impacts on young girls' schooling.

NOTES

1. Other liberalization policies from the mid-1980s to the mid-1990s included dismantling state marketing structures, eliminating subsidized state credit and fertilizer subsidies, establishing market-determined prices for agricultural inputs and produce (except maize), and permitting smallholders to grow export burley tobacco. Fertilizer subsidies were re-established in 1998 with the Starter Pack Scheme which consisted of improved maize and legume seeds and fertilizer (Orr & Mwale 2001).

2. EPA is the basic administrative unit of the Ministry of Agriculture and Irrigation in Malawi.

3. Ordinary least squares regression.

4. The indicator is defined as (the highest grade attained)/(age − 5). More detailed discussion regarding the school progression model can be found in Yamano, Shimamura and Sserunkuuma (2006).

5. Two stage least squares regression.

6. Malawi is commonly divided into three regions: northern, central, and southern. The north is less densely populated than the other two regions, and the best agricultural land is found in the south. There are also ethnic and cultural differences among the regions; for example, northern communities tend to be patrilineal while central and southern communities tend to be matrilineal.

7. The proportion of female-headed households in the program communities is smaller than in the non-program communities (statistically significant at the 10% level).

8. In addition, there were very few borrowers from other formal sources other than MRFC.

9. The Second Integrated Household Survey conducted in 2004/05, for example, shows that the national level credit participation rate is 2.1% (240 out of 11,280 households).

10. Dependents are defined as those aged under 15 and above 65.

11. Regression analyses on educational expenditures reveal similar results.

12. Although we have data on children ages 19–24, the number of children attending school at these ages is very low. Also, for this age group it is difficult to attribute their current school attendance to the program effect without their knowing borrowing history because re-entry among this age group is rare.

13. They find, however, that longer hours of resource-collecting reduce girls' school attendance.

14. The agricultural peak season corresponds to the beginning of the academic year in Malawi.

15. In our sample, MRFC client households tend to increase payments for non-family labor, so labor markets seem to function at least partially.

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