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RESETTLEMENT AND FOOD SECURITY

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The average smallholder farmer in Malawi is tasked to feed a family of five on a farm of less than one hectare in size (NSO, 2008). The intensification of land through, for example, fertilizer use plays a prominent role in Malawi's policy to increase the productivity potential of smallholder farmers. With the population almost doubling in the last twenty years (NSO, 2008), additional measures are needed to accommodate the growing number of young, landless Malawians and relieve land constraints for the remainder. The government of Malawi with financial support from the World Bank created a land reform project to address exactly this concern in 2005. The Community-Based Rural Land Development Project (CBRLDP) targets households facing severe land shortages, to provide them opportunities to obtain larger farms in adjacent communities. To date, the program has 15,000 participating households.

In 2011, the International Food Policy Research Institute (IFPRI) collected data for the final round of a panel survey to evaluate how the resettlement project affected the food security of program participants in the long term. Although programs like the CBRLDP appear in other African countries, few quantitative evaluations measure the short- or long-term impact of resettlement policies. However, great lessons can be learned from ongoing research on this matter in terms of the roles of land reform and migration in improving food security in sub-Saharan Africa.

COMMUNITY-BASED RURAL LAND DEVELOPMENT PROJECT

As part of the Malawi Land Reform Program Implementation Strategy (2003-2007), the CBRLDP was designed to diminish social conflicts that arose from severe land pressure and degradation in southern Malawi. Eligible households in four districts (Mulanje, Thyolo, Machinga, and Mangochi) volunteered to receive land from former tobacco and tea estates in Machinga and Mangochi. Two additional districts (Ntcheu and Balaka) were added for resettlement in 2008.

Household eligibility depended on Malawi citizenship, land impoverishment, and food insecurity. Participants were required to organize themselves into small beneficiary groups of between 10 and 35 households who were willing to relocate to another area to farm, following the project's recommended practices. Within the group, a smaller committee was formed to identify suitable land, negotiate the acquisition of land, and manage the activities of the group, such as obtaining legal documentation and withdrawals of project funds.

As part of the program, each household received two hectares of land, a cash grant, and access to services. In addition to their own allocation, households had access to 3 to 5 hectares of communal land shared among the beneficiary group members, and received a group-level title deed that was signed by all members. The cash grant amounted to $1050 per household, typically allocated to farm development (62 percent), land purchases (30 percent), and a resettlement allowance (8 percent). In addition to the cash grant, households received access to agricultural extension services and financial and land resource management training. Since some households moved longer distances, the informational sessions familiarized them with the new terrain in which they had settled and local agricultural and market conditions.

DATA AND METHODOLOGY

IFPRI conducted a survey in August 2011 to complement a panel survey (2006-2009) to evaluate the CBRLDP. The previous rounds were collected by consultants commissioned by the World Bank and the Government of Malawi. Households were assigned into four groups to facilitate the identification of short- and long-term impacts. For the purpose of the long-term evaluation, IFPRI followed participants who resettled in Machinga and Mangochi (the long-term treatment group) and non-participants living in the adjacent Balaka and Chiradzulu districts (the long-term control group). The impact evaluation is based on comparisons between 220 treated and 333 control households in adjacent districts that were present during the 2006 (baseline) and 2011 surveys.

One of the main challenges in measuring the long-term impacts of the resettlement program is that participation is not random. Households volunteered and were eligible based on the aforementioned criteria. A simple comparison of the outcomes of participants and non-participants could potentially produce biased estimates. Suppose participating households are poorer or less skilled than non-participating households, we might attribute negative impacts to the resettlement program when in fact the effects are being driven by unobservable sample differences. To reduce the potential for bias of this sort, we use the nearest neighbor matching approach that compares the outcomes of program participants with similar non-participants using a suite of observable characteristics (Abadie et al., 2004). We further apply a difference-in-difference matching estimator to reduce an additional source of bias that may come from having an inadequate number of controls of time invariant characteristics, for example, household head's farming ability.

METHODOLOGY

The difference-in-difference matching estimator is used to calculate our measure of impact for those who participated in the resettlement program, the average impact of the treatment on the treated (ATT), which compares the change in 2011 and 2006 outcomes levels by resettlement participation:

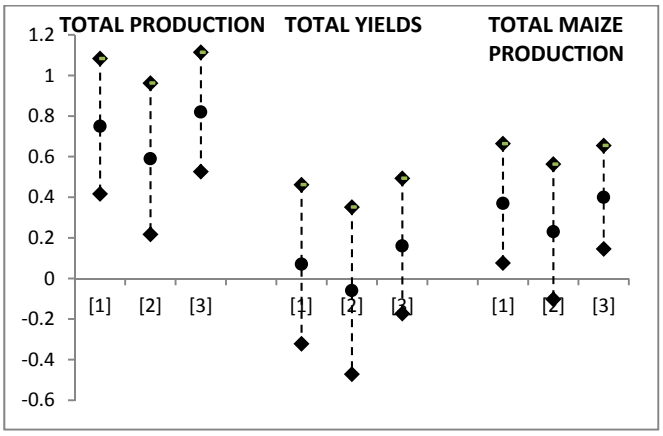
ATT= $E\left(Y^1_{2011} - Y^1_{2006} | X, S,\ R = 1\right) - E\left(Y^0_{2011} - Y^0_{2006} | X, S,\ R = 1\right)$

R is an indicator which assigns a value of 1 to households that participated in the program and 0, otherwise. Beneficiary and control household outcomes, for example, production and consumption, are represented by Y^1 and Y^0, respectively. To match similar resettled households with control households, we use a vector of baseline variables *X* that reflect household eligibility and their expected return from participation, as well as a vector of variables that reflect household exposure to shocks *S*. As robustness checks, we also provide nearest neighbor matching estimates using a trimmed sample and estimates from regressions that weight observations by a function of the propensity scores (Hirano, Imbens, and Ridder, 2003).

FOOD SECURITY

We present in Figure 1 three estimates for the resettlement impact on long-term production and their corresponding 95 percent confidence intervals. The three estimates come from different specifications: [1] nearest neighbor matching with two matches, [2] nearest neighbor matching with the trimmed sample, and [3] propensity-score weighted regression (see Box 1). We find that the resettlement program increased the total production of treated households within a range of 59 to 82 percent in the long term. However, we do not find robust differences in total yields. The benefits largely come from the expansion of farm size. Total maize production improvements range between 37 and 40 percent, but are not robust to all specifications – note that the 95 percent confidence interval in [2] contains zero. Though not shown here, the authors find resettlement households diversify their portfolio, growing a greater percentage of pigeonpea, groundnut, and tobacco than do control households.

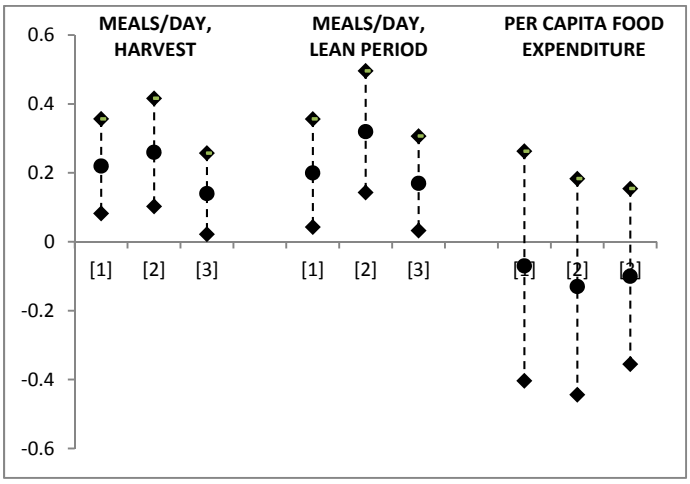
Figure 1: Resettlement Impact on Long-term Production (percentage change with 95% confidence intervals)



Notes: We present three estimates from Mueller *et al.* (Forthcoming).
[1] Estimate from nearest neighbor matching approach with two matches.
[2] Estimates from trimmed, nearest neighbor matching approach with two matches.
[3] Estimates from propensity-score weighted regression.

Improvements in production also are manifest in a greater number of meals per day consumed during the harvest and lean periods over the long term, but not in greater per capita food expenditure (Figure 2). The timing of the final survey partially explains the findings on food expenditure. In 2011, both treatment and control group households were exposed both to a global food price crisis and to a local economic crisis. However, beneficiary households might have been more vulnerable to these shocks because the average distances they had to travel to the nearest market shop, input, or output market far exceeded those travelled by control households. The overall demand for non-staple food items likely declined at a greater rate for treated households due to their lower purchasing power.

Figure 2: Resettlement Impact on Long-term Consumption (percentage change with 95% confidence intervals)



Notes: We present three estimates from Mueller *et al.* (Forthcoming).
[1] Estimate from nearest neighbor matching approach with two matches.
[2] Estimates from trimmed, nearest neighbor matching approach with two matches.
[3] Estimates from propensity-score weighted regression.

Remoteness might also influence crop choice differences, since there were otherwise no significant differences between participants and non-participants in key agricultural inputs other than land. While every household grew maize over both time periods, beneficiary households increased maize production over time. They also produced more tobacco in the long term. For resettlement households, tobacco may be a relatively safe cash crop since the resettlement land may be more suitable for its production, having originated from large tobacco estates. Similarly, good access to tobacco markets likely predates the resettlement program. Thus, the diversification of alternative crops to tobacco for profit might be riskier for resettlement households, given remoteness and access to markets to sell alternative goods.

PROPERTY RIGHTS

We also examine how the resettlement program might have influenced land security. Whether land allotments were registered under customary, freehold, or leasehold status was at the discretion of the beneficiary groups. Since households relocated to areas away from their families among people with different customs and ethnic backgrounds, we were interested in investigating how resettlement might have changed matrilineal land inheritance and property rights. We find significantly more heads of households in the resettlement program have land titles (Table 1) with a greater percentage of female household heads having land titles than the percentage of male household heads.

We also use plot-level information on the gender of the plot owner, plot size, and mode of acquisition collected in 2011 to examine the extent to which the program might have influenced the control of land within the household. We observe that land rights of men in beneficiary households are disproportionately stronger than those of women. Male plot owners in beneficiary households tend to have a greater proportion of land purchased with title or leased. The titling process under the resettlement program might have affected women (most who are not heads) in beneficiary households by providing more formalized property ownership to men.

Table 1: ATT on Gender-differentiated Land Holdings and Rights

	Nearest neighbor matching with two neighbors		Propensity score weighted regression		N
2011 Head of household responses					
Has a title for landholdings	0.18***	[0.05]	0.16***	[0.04]	534
Male household head has title for landholdings	0.17***	[0.06]	0.14***	[0.05]	399
Female household head has title for landholdings	0.24**	[0.10]	0.27**	[0.10]	127
2011 Plot level data					
Total landholdings owned by men	0.49***	[0.09]	0.55***	[0.07]	539
Total landholdings owned by women	0.03	[0.07]	-0.02	[0.06]	539
Proportion of men's land given by chief	-0.01	[0.02]	-0.01	[0.02]	539
Proportion of women's land given by chief	-0.08***	[0.02]	-0.04**	[0.02]	539
Proportion of men's inherited land	-0.34***	[0.04]	-0.34***	[0.03]	539
Proportion of women's inherited land	-0.50***	[0.04]	-0.51***	[0.03]	539
Proportion of men's land purchased with title	0.10***	[0.03]	0.11***	[0.02]	539
Proportion of women's land purchased with title	0.06***	[0.02]	0.07***	[0.02]	539
Proportion of men's land purchased without title	0.05***	[0.02]	0.04**	[0.02]	539
Proportion of women's land purchased without title	0.03*	[0.02]	0.03*	[0.02]	539
Proportion of men's land that is leased	0.47***	[0.04]	0.47***	[0.03]	539
Proportion of women's land that is leased	0.20***	[0.03]	0.20***	[0.02]	539

Source: Mueller et al. (Forthcoming)

Notes: *** p<0.01, ** p<0.05, * p<0.10. Standard errors presented in the square brackets. Total landholdings reported in hectares.
ATT - average impact of the treatment on the treated.

LESSONS LEARNED FROM MALAWI'S LAND REFORM PROJECT

Offering households additional land through resettlement programs is one possible avenue to increase food security in Malawi. Resettlement accompanied with sustainable intensification, access to cheaper inputs and alternative crop varieties may further foster yield growth. While careful attention was placed to transition the beneficiary households in the short-term, the remoteness of resettlement sites offered disadvantages. Building market linkages within future resettlement programs will improve project impacts. Finally, despite the food security benefits of the program, women among male-dominated households suffered from a lack of protection over their property rights, originally embedded in traditional practices. Addressing this issue at the onset, through the involvement of women in the land registration and titling process, may help protect their rights.

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