Cash crop liberalization and poverty alleviation in Africa: evidence from Malawi

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Abstract

This article uses the case of burley tobacco liberalization in Malawi to investigate the efficacy of cash crop liberalization as an instrument for poverty alleviation in sub-Saharan Africa. The principal justification for cash crop liberalization is that markets allow farm households to increase their incomes by producing that which provides the highest return to their productive resources and use the cash to buy consumption goods. Using a latent welfare model, we find that households that selected to grow cash crops had higher incomes than those that did not grow cash crops. However, we also find that due to the lumpiness and seasonality of cash crop incomes, higher household incomes, while increasing food purchases did not significantly affect per capita food intake. Irrespective of participation in cash crops, for much of the cropping season rural households seem to rely more on nonfarm income for expenditure and consumption smoothing.

JEL classification: O55, Q18

Keywords: Africa; Malawi; Agricultural liberalization; Cash crops; Rural poverty alleviation

1. Introduction

Since the early 1980s a number of African countries have liberalized the production and marketing of cash crops as a route to rural poverty alleviation and livelihoods support. The link between cash crop liberalization and rural poverty alleviation is often advocated as part of a broader strategy of comparative advantage (Govereh and Jayne, 2003; Timmer, 1997). The underlying argument is that for a given amount of resources, specialization in cash crop production allows farm households to increase their income by producing that which provides the highest returns to their productive resources and use the cash to buy consumption goods (Timmer, 1988). However, although conceptual and simulation models generally predict that cash crop liberalization will result in significant welfare gains, informed opinion is sharply divided over the efficacy of cash crop liberalization as an instrument for poverty alleviation in rural Africa.

The comparative advantage literature suggests a number of pathways through which cash crop liberalization contributes to rural poverty alleviation. First, cash crops contribute to livelihoods diversification and poverty alleviation by directly increasing the farm household’s income earning potential, which in turn increases the household’s spending potential. Since cash crops earn higher value than food crops, the production of cash crops enables the farm household to obtain more income and food than it could obtain by devoting the same resources to own-food production. Second, benefits from cash cropping also accrue to nonparticipants due to higher returns to family labor (Poulton et al., 2001). Since most cash crops tend to be labor-intensive, cash cropping entails a substantial expansion of the demand for hired labor. To the extent that households that hire out labor are those that could otherwise not participate, this employment effect may represent a significant livelihood strategy.

Third, the introduction of cash cropping opportunities contributes to the development of rural financial markets. In general, the introduction of cash cropping opportunities results in partial relaxation of cash constraints at planting through delivery of cash crop inputs on credit. Moreover, the introduction of cash cropping opportunities may also positively affect the productivity of other household activities through household-level synergies (Govereh and Jayne, 2003). That is, since the introduction of cash crops is often accompanied by improved delivery of inputs on credit, participation in a cash crop scheme may enable a farm household to acquire resources that it otherwise would not, for use in other elements of the crop mix.

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input into the crops (see studies in V on Braun and Kennedy, 1994). Finally, cash cropping opportunities are also generally accompanied by improved technology.

However, there is also reason to suspect that the impact of cash crop liberalization on the welfare of farm households may be more limited than is generally acknowledged (Orr, 2000). First, most of the predicted gains in welfare due to cash cropping are based on the notion of comparative advantage and specialization in agricultural production. Yet, portfolio theory predicts that as long as farm households prefer to smooth their consumption over time and are risk-averse, then rather than fully specialize, household resources will in part be allocated to minimize the overall riskiness of income or to smooth consumption (Reardon et al., 1992; Rosenzweig, 1988). Risk-aversion due to uncertainty in the food marketing system gives rise to the non-separability of production and consumption decisions, which accounts for the potential breakdown of agricultural liberalization strategies based on comparative advantage (Fafchamps, 1992). Moreover, the farm household literature cautions that although liberalization enhances the opportunities for producers and products with a clear comparative advantage, it can expose poor households that are ill-equipped to respond to changing market conditions or changing production techniques (Poulton et al., 1998).

Although the divergence of the two positions is obvious enough, it is important to recognize that underlying both positions is a shared assumption, which has thereby been removed from the arena of debate. Implicit in the explanation of agriculture’s role in economic development and rural poverty alleviation is an understanding that subsistence agriculture needs to undergo a process of commercialization or liberalization (Poulton et al., 1998) and that the issue is not about whether but how subsistence agriculture should be transformed (Paolisso et al., 2002; Von Braun and Kennedy, 1994). Yet, by definition, cash crop liberalization targets an intermediate poverty focus, income security, not the ultimate poverty focus, household food security. A critical assumption is that as the farm household earns more income, the market will broaden the scope for its welfare maximization because increases in income will assure household food security by increasing the farm household’s access to food through the market.

Underlying this impact chain is a further assumption of a transmission mechanism such that an increase in income is expected to change expenditure and consumption behaviors and practices in ways that lead to the achievement, or raise the probability of achieving food security. Unfortunately, this impact chain is at variance with much of the empirical evidence from the food security literature which suggests that cash cropping is associated with missed opportunities for improving household welfare. First, due to imperfect or missing factor markets, income and employment benefits of commercialization are not spread equally between and within households. It is common for women’s work in commercialized crops and women’s direct control over income from these crops to be much less than that of men and frequently even disproportional to their labor input into the crops (see studies in Von Braun and Kennedy, 1994). Second, due to weak financial markets for expenditure and consumption smoothing, when cash cropping opportunities increase household incomes, allocating more of that income to food purchases is not as automatic as the comparative advantage literature seems to suggest (Paolisso et al., 2002).

The purpose of this article is to investigate the efficacy of cash crop liberalization as an instrument for rural poverty alleviation in Africa using the case of burley tobacco liberalization in Malawi. We advance the debate over why increases in household income due to participation in cash crop schemes appear not to translate into improvements in household welfare by (1) assessing the independent effects of participation in burley tobacco on household income, (2) isolating the impact of participating in burley tobacco on food security, and (3) analyzing the impact of burley tobacco income on household food security.

The rest of this article proceeds as follows. The next section briefly outlines the genesis of Malawi’s burley tobacco liberalization program. In Section 3, we develop a latent welfare framework for analyzing the nexus between cash cropping and household welfare, while in Section 4 we present an overview of the data and sampling methodology. Section 5 reports results of our model, Section 6 discusses the results and implications for policy, and Section 7 concludes.

2. Burley tobacco liberalization in Malawi

Since the early 1980s, Malawi has been implementing wide-ranging sectoral and structural reforms with financial and technical assistance from the World Bank and International Monetary Fund (see Chilowa and Chirwa [1997] for a deeper analysis of these reforms). However, despite these reforms, poverty has become more pervasive and the income distribution more skewed. With a Gini coefficient of 0.62, income inequality is the second highest recorded in Africa, and Malawi’s nominal per capita gross domestic product (GDP) of 140 US$ makes it the seventh poorest in the world. Recent studies suggest that half of all farm households are food insecure while 60% of farm households earn incomes below the official poverty line (Government of Malawi, 2000).

Agriculture is the backbone of the economy, accounting for 40% of GDP and 85% of exports and formal employment. Until 1990, the agricultural sector was characterized by the coexistence of estate and smallholder sectors which were differentiated by land tenure and regulations concerning the production and marketing of different crops. The estate sector was characterized by relatively capital-intensive production of high-value export crops, such as tobacco, tea, and sugar. In contrast, the smallholder sector was oriented toward subsistence production, accounting for 80% of food production and only 10% of exports (Diagne and Zeller, 2001). Under the Tobacco and Special Crops Act, smallholder farmers were prohibited from growing burley tobacco, a labor-intensive cash crop, whose expansion underpinned Malawi’s high growth rates of the 1960s and 1970s (World Bank, 1994). Whereas estate output was marketed at the
auction floors at farmgate export parity prices, smallholder output was marketed through the Agricultural Development and Marketing Corporation (ADMARC) (Kydd and Christiansen, 1982). Land cultivated by estates is privately owned (freehold land) or leased from the state on long-term leases (leasehold land) while land cultivated by smallholder farmers is governed by customary law (Diagne and Zeller, 2001).

In the grand scheme of things, it was assumed that the relationship between the estate and smallholder sectors would be mutually beneficial or benign at worst, as smallholder farmers would benefit from technological spillovers and income diversification from estate employment while at the same time alleviating pressure on their own land (Mkandawire, 1999). In reality, Malawi’s agricultural policy resulted in an agriculture sector with a dual structure, involving a few thousand commercially oriented estates with privileged access to credit, extension and producing for export markets, on the one hand, and a smallholder sector with nearly 2 million farm households producing mainly for subsistence, on the other hand (Government of Malawi, 1995). The lack of access to rights to grow high value cash crops coupled with a lack of appropriate high-yielding food technologies and inadequate supplies and use of inorganic fertilizer reduced the real rate of return to smallholder agriculture and increased distributional inequity between the estate and smallholder sectors (Kydd and Christiansen, 1982; Pryor, 1990).

With the introduction of multiparty politics in the 1990s, Malawi adopted the concept of poverty alleviation as a pivotal component of its overall development thinking and the key to accessing a growing portion of multilateral and bilateral donor funding and for debt relief. Under this framework, two scenarios have come to characterize Malawi’s poverty alleviation strategies: the Green Revolution and burley tobacco liberalization (Orr and Orr, 2002). Under the Green Revolution scenario, poverty alleviation is premised on growth in smallholder income which, in turn, is predicated on increasing the production of maize, by far the most important crop in terms of area cultivated, number of growers, and food security. In principle, as maize production rises and farm households become more food-secure, the relative price of maize would start to decline. Since expenditure on maize constitutes a large share of household expenditure, this will represent a net gain in income for most farm households (Orr and Orr, 2002). To this end, a program of large-scale distribution of free fertilizer and hybrid maize was implemented under the umbrella of the Starter Pack, a targeted input program which supplies farm households with free improved seed and fertilizers (Orr and Orr, 2002).

Poverty alleviation through burley tobacco liberalization, which is the concern of this article, is based on the removal of long-standing legal and institutional constraints that precluded smallholder farmers from growing burley tobacco on customary land (Orr, 2000; World Bank, 1994). Under the World Bank-funded Agricultural Sector Adjustment Credit (ASAC) of 1990, the production of burley tobacco by smallholder farmers on customary land was first permitted on a pilot basis during the 1990/1991 growing season when a total of 7,600 growers were registered to grow burley tobacco with a maximum quota of 300 kg per farmer. According to the World Bank, “the objective of this element was to allow smallholders access to a broader means of increasing their incomes, in order to reduce poverty and, simultaneously, provide farmers with a means of financing the intensification of their maize production” (World Bank, 1994, p. 14).

The ASAC also sought to remove price controls in input and output markets. On the input side, the Malawi government created the Malawi Rural Finance Company (MRFC) to extend in-kind seasonal agricultural credit to smallholder farmers who were initially organized into joint liability credit groups of 5–10 members who share a single loan issued to the club (see Diagne and Zeller, 2001). Owing to the success of the experimental program, the Tobacco and Special Crops Act was eventually repealed in 1996, and production of burley was opened to any grower in Malawi, regardless of whether they were registered to grow the crop or belonged to a credit club. The repeal also abolished large-scale tobacco farmers’ special marketing rights. Whereas smallholder tobacco had to be sold initially to the state marketing board, ADMARC, at below-market prices, by 1996 83% of smallholder tobacco was marketed directly to the auction floors (Diagne and Zeller, 2001).

3. Specification of the econometric model

3.1. Participation and welfare model

Farm households that are eligible to grow tobacco choose to participate if the benefits of participation outweigh the costs. Thus in the initial period, smallholder farmers calculate their expected welfare, conditional on favorable weather and optimally choosing inputs, given their household’s factor endowments. A smallholder farmer selects to grow tobacco if the expected welfare after growing tobacco is at least as great as the expected welfare under the status quo or under alternative livelihoods strategies.

Like most anti-poverty interventions, eligibility criteria to grow tobacco were based on asset holdings. However, since a household’s current-period asset holdings reflect asset and portfolio allocation decisions in previous periods, we model current participation as a function of current period characteristics and past asset decisions and rural credit market constraints. A standard threshold-crossing model leads to the following probit specification for participation:

$$Pr[d_{it} = 1] = F(\gamma'Z_{it}),$$

(1)

where $d_{it}$ is an indicator variable that denotes the participation status of household $i$ at time $t$; $d_{it} = 1$ if the household grew burley tobacco at time $t$, and $d_{it} = 0$ otherwise. $F(\cdot)$ is the cumulative normal distribution function and the vector $Z_{it}$ contains variables thought to affect the costs and benefits of a household’s participation in the burley tobacco program. From this,
one can write a likelihood function and estimate the probability of selection into a tobacco program which is equivalent to estimating a probit model where the latent variable $d_{it}$ is defined by:

$$d_{it} = y'Z_{it} + v_{it}, \quad (2)$$

and $v_{it}$ is an error term that captures unobserved components influencing participation.

Suppose that at time $t$, we observe the welfare for a group of smallholder households. Let $W_i$ be a generic welfare outcome measure for household $i$ at time $t$. Define:

$$W_{it} = \begin{cases} W^*_i & \text{if } d_{it} = 0, \\ W^*_i + d_{it}\Delta & \text{if } d_{it} = 1, \end{cases} \quad (3)$$

where $W^*_i$ is the $i$th household’s latent welfare status, its level of welfare if it does not grow tobacco, $d_{it}$ is a dummy variable generated according to Eq. (2); $\Delta_{it} = W^*_i - W^*_{it}$ denotes the impact of participation in tobacco on household welfare and represents the parameter of interest. In this study, we use two broad categories of measures of welfare: income (total household and nonfarm income) and food security (total food consumption and food purchases).

3.2. Methodological issues

Empirical assessment of the impact of any anti-poverty intervention using household survey data suffers from some methodological problems which can call into question the validity and robustness of conclusions derived. On the one hand are methodological problems associated with measuring the actual impacts of the intervention, and on the other hand are specification issues associated with modeling those impacts. Given the nature of the data from household surveys, although we cannot alleviate all possible methodological concerns, we can address some.

3.2.1. The problem of the counterfactual

Attempts to evaluate the impact of anti-poverty interventions have utilized one of three techniques: the “planned-versus-actual” approach compares actual outcomes with expected outcomes; the “before-versus-after” technique seeks to compare actual outcomes during and after an intervention with outcomes in a previous period; and the “with-versus-without” approach compares actual outcomes with what would have happened in the absence of the intervention. In the last two approaches, measuring the effect of an intervention requires a counterfactual. However, underlying the use of counterfactual is the notion that impact is what happened with the anti-poverty intervention that would not have happened without it (Schreiner, 2002). The problem then is how to evaluate what welfare levels would be if the intervention did not exist.

Although the “before versus after” is the most ideal, research has shown that it falsely ascribes all subsequent changes in outcomes to the intervention (Schreiner, 2002). Therefore, in concert with much of the literature, we use the “with-versus-without” approach since it is the easiest of the three to implement while overcoming the difficulty of extraneous factors intervening in the program period (as in before versus after) and the problem of the appropriate specification of program targets (required for the plan versus actual). Our strategy is to compare outcomes between participants and a control group of eligible nonparticipants as the counterfactual.

3.2.2. Selection bias

Although the “with” case did happen and the welfare of participants can be observed, the “without” case did not happen. For differences in welfare outcomes to be attributed to program participation, a necessary condition is that nonparticipants match participants in all ways except for treatment. When this condition holds, the welfare outcome, $W_{it}$, is statistically independent of treatment status, $d_{it}$, and the impact of growing tobacco could be directly estimated as:

$$W_{it} = \beta'X_{it} + d_{it}\Delta + \varepsilon_{it}, \quad (4)$$

where $X_{it}$ is a vector of observable variables affecting welfare, including household demographics, assets, community characteristics, and prices, $\beta$ is a vector of fixed parameters, and $\varepsilon_{it}$ is a normally and identically distributed error term.

However, we know that households self-select to grow tobacco, in that households who expect high net benefits from growing tobacco are more likely to select to grow tobacco than those who expect low or negative net benefits. Thus, the average net benefit for participants probably exceeds the average net benefits for eligibles, had they participated. Moreover, the decision to grow tobacco was also determined by whether there was a tobacco credit program in the village in which the smallholder resided and whether the household was considered poor enough for participation. Since selection was nonrandom, in Eq. (4) the dummy indicating participation $d_{it}$ will be correlated with the error term, $\varepsilon_{it}$ so that $E(\varepsilon_{it}d_{it}) \neq 0$. Consequently, in expectation $\varepsilon_{it}$ will not equal zero and $E(W_{it} | X_{it}) \neq \beta X_{it} + d_{it}\Delta_{it}$. Under these conditions, the population of nonparticipants constitutes a nonequivalent comparison group and the difference between welfare outcomes of the two groups would not be a valid measure of program effect.

There are two possible sources of this bias: either from model uncertainty, especially the unobserved determinants of $d_{it}$ (the $Z_{it}$ from the selection model) or from correlated error terms $E(\varepsilon_{it}v_{it}) \neq 0$. To address the former bias, one simply controls for the unobserved determinants. To control for the latter selection bias, Heckman (1988) suggests incorporating the expected value of the selection error term into the equation for the estimation of the welfare indicator. For households that participated in burley tobacco, the correction term is given by:

$$\lambda_1 = E(\varepsilon_{it} | d_{it} = 1) = \frac{\phi(y'Z_{it})}{\Phi(y'Z_{it})}, \quad (5)$$

where $\phi$ and $\Phi$ are the normal density and cumulative density functions, respectively. For households that selected not to
participate in burley tobacco, the correction term is given by:

$$\lambda_0 = E(v_{it} | d_{it} = 0) = \frac{-\phi(y'Z_{it})}{1 - \Phi(y'Z_{it})}. \quad (6)$$

Therefore, the empirical welfare equations become:

$$E(W_{it} | Z_{it}, X_{it}, d_{it} = 1) = \beta'_0 X_{it} + \theta_1 \lambda_1, \quad (7)$$

$$E(W_{it} | Z_{it}, X_{it}, d_{it} = 0) = \beta'_0 X_{it} + \theta_0 \lambda_0. \quad (8)$$

An empirical problem that bedevils the implementation of this two-step procedure is finding an appropriate identification variable. The estimation of the participation model ($d_{it}$) is only possible if the vectors $Z_{it}$ and $X_{it}$ are not common. In our case, this is easily resolved because determinants of participation, $Z_{it}$ include current and past period household characteristics while determinants of welfare, $X_{it}$, are current period household and community characteristics.

3.2.3. Omitted variable and endogeneity bias

In deciding what variables to include as regressors, one inevitably has to choose the lesser of two evils: omitted variable bias or endogeneity bias. With respect to omitted variable bias, it is conceivable that the empirical effects of participation and other variables on an outcome of interest may be due to omitted variables which are correlated with participation decisions, asset holdings, or welfare outcomes. However, an attempt to address this bias by including other regressors invariably raises the potential for introducing endogeneity bias. For instance, since eligibility to grow tobacco is based on some poverty criteria, it follows from the participation and welfare equations that welfare outcomes, household asset holdings, and participation are simultaneously determined by each household.

In this article, we take the view that the impact of endogeneity bias is more serious than omitted variable bias. Therefore, we employ an instrumental variables approach to estimate the empirical welfare equations. The appropriateness of this approach, however, is contingent on finding instruments that are correlated with the decision to grow tobacco but not welfare per se. The instrument for tobacco participation is distance from each household to the nearest tobacco seeds and input market. Similarly, when we investigate the impact of tobacco income on food security, tobacco income will be instrumented by distance to the nearest tobacco-buying outlet.

4. Data and methodology

We use data from a survey conducted by the International Food Policy Research Institute in conjunction with the Bunda College of Agriculture of the University of Malawi in 1995. The study involved a three-round household survey which collected detailed information on various activities undertaken by 404 households in 45 villages in five districts in Malawi: Rumphi, Nkhata-Bay, Dowa, Mangochi, and Dedza. The first round of the survey took place in February–April 1995, the second in July–August 1995, and the last round in November–December 1995. The head of the household, and individual adult members, responded to questions on household demographics; land tenure, agricultural production, livestock ownership; asset ownership and transaction; food and nonfood consumption; credit, savings, and gift transactions; wage and self-employment income and time allocation; and anthropometric status of preschoolers and their mothers.

Although the survey collected information on many socioeconomic characteristics of farm households, it was principally designed to study the determinants of access to and participation in existing formal and informal credit and saving programs. However, out of 4,699 households enumerated in the 45 villages covered in the village census undertaken for the survey, only 12% were current members of credit clubs. Due to the low density of credit program participation, the survey used choice-based sampling. That is, the survey was designed quasi-experimentally to include both the participating and nonparticipating households (see Diagne et al. [1996] for a full discussion of the sampling methodology). As such, about half of the households in the sample were participants in credit programs administered by the Malawi Rural Finance Company (MRFC), a state-owned and nationwide agricultural credit program; the Malawi Mudzi Fund, a replica of the Grameen Bank; the Malawi Union of Savings and Credit Cooperatives (MUSCCO), a union of locally based savings and credit associations; or a government credit program for the “Promotion of Micro-Enterprises for Rural Women” (PMERW). The other half of the sample either had previously participated in a former credit program of the Smallholder Agricultural Credit Administration (SACA), or had never participated in any formal credit program.

To explore the impact of participation in burley tobacco, tobacco income and other variables on income and food security, the following variables are considered: household labor supply, education, past and current participation in credit clubs, farm and nonfarm income, the household’s farm size, the value of farm capital, food production risk and tobacco storage risks and average prices of staple food. Education is measured as the number of years of formal education completed by the household head, while labor supply is proxied by the adult equivalent population. To understand our measure of credit, we need to distinguish between access to credit and participation in a credit program. A household has access to a particular source of credit if it is able to borrow from that source, although for a variety of reasons it may choose not to (Diagne and Zeller, 2001). In contrast, a household is said to be participating if it is borrowing from the credit source. In this study, we include past and current participation in credit clubs with a dummy variable which takes the value of 1 if the household received any credit, whether in cash or kind, from registered financial institutions for agricultural inputs or micro-enterprise development in the period of interest.

Farm size, measured in hectares, represents the total land area controlled by the household. Total income is the sum of farm and
nonfarm income, where farm income comprises incomes from the sale of livestock products and value crops—whether major or minor crops, food, or cash crops. Since a significant proportion of rural households’ production is for subsistence, we use the value of crop production (i.e., harvested value) rather than the value of output actually marketed. Nonfarm income mostly captures income earned by smallholders from casual labor, contract labor, self-employment, and other off-farm activities. Farm capital is the value of farm implements, e.g., hoes and ploughs, but excludes value of draft animals. Food-crop production risk is a weighted index of environment-related dummy variables for crop risks in the field such as flooding or drought. In contrast, tobacco storage risk is a dummy equal to one if there was a chance of post-harvest loss or spoilage of tobacco. Other demographic variables such as age, gender, and marital status of the head of the household are self-explanatory and will be discussed as necessary in the results section.

4.1. Demographic and economic characteristics

Table 1 summarizes the demographic and economic characteristics of the households in our sample, distinguishing between nontobacco and tobacco growing households. The evidence in the upper part of the table suggests that the household size and composition of farm households may be related to the household’s choice of productive activity. On average, tobacco-growing households are larger and have higher labor supply than nontobacco households. For instance, tobacco households have 4.3 adult equivalents, in contrast to 3.5 adult equivalents in nontobacco households.

Table 1 also highlights other interesting patterns that set the stage for the subsequent multivariate analysis. First, there is prima facie evidence that participation in the tobacco scheme significantly affects household incomes. The middle portion of the table shows that tobacco households have twice as much total income and four times as much farm incomes than nontobacco households. Moreover, although nonfarm income constitutes a relatively larger proportion of total income for non-tobacco households, in level terms, the mean value of nonfarm incomes are not statistically different. Second, the lower part of Table 1 shows that although tobacco growing households have higher household incomes, the per capita caloric intake in tobacco households is significantly lower than caloric intake in nontobacco households. Apparently, although tobacco generates a lot of income, tobacco households either spend most of their income on luxuries or on foods with relatively lower caloric content. Whereas 40% of the children in households that did not grow tobacco are stunted, in tobacco growing households the corresponding fraction is 68%.

5. Regression results

All results reported use weighted least squares to correct for the choice-based nature of the sample. Note that since the underlying choice-based sampling was with respect to participation in credit schemes, sampling was random with respect to tobacco participation so that weighted least squares will provide consistent and efficient estimates. Although the original sample comprised 404 observations, using Hadi’s (1992) algorithm for detecting outliers in a multivariate setting, seven observations were excluded and the analysis that follows is based on 397 households.

5.1. Determinants of participation in tobacco

Since the decision to grow tobacco is made at the beginning of the cropping season, participation is, to a large extent, influenced by initial conditions and past period household and market characteristics. The smallholder farmer’s decision to grow tobacco is modeled as a function of the household’s farm size, farm capital, the labor supply, and past experience in credit clubs. In addition, participation may also be influenced by the existence of alternative livelihood opportunities (represented by nonfarm income) or the household’s perception of its exposure to risk (in food crop production and or tobacco storage).

Table 2 presents results from a logistic regression of factors that influence the likelihood that a smallholder farmer will grow tobacco. Statistically significant regressors that increase the probability that a farmer will grow tobacco are the labor supply and risk of food crop failure. Since burley tobacco husbandry is labor-intensive, labor supply is obviously a significant predictor of participation. Similarly, as the risk of food crop failure rises in a predominantly subsistence economy, households are more likely to diversify into cash crops.

Two factors decrease the likelihood that a smallholder farmer will choose to grow tobacco: tobacco storage risk and nonfarm income. Since nonfarm livelihood strategies are an alternative to livelihood diversification through cash cropping, all else being equal, as nonfarm income rises, a smallholder farmer is less likely to select to grow tobacco. In addition, when smallholder farmers are less likely to participate in cash crops, the risk of post-harvest spoilage is greater. However, neither the
past-period financial market variable nor the demographic characteristics of the household head have any statistically significant influence on the decision or odds of choosing to grow tobacco.

5.2. Impact of participation in tobacco on income

Table 3 presents regression results on the determinants of total and nonfarm income. Three caveats are in order. First, except for the dummies for gender, marital status, and access to credit, all variables entered the model in natural logarithms. Since we used the log–log form, the corresponding coefficients can be interpreted as elasticities. Second, although all the variables included in the models are considered important, we focus our analysis on the impact of the key policy variable, tobacco participation (\(\lambda_1\)). Third, since some household characteristics affect both the participation decision and welfare outcomes, household welfare and tobacco participation are jointly determined. To deal with this endogeneity, we employ an instrumental variables approach where by tobacco participation is instrumented with the distance to tobacco seed and input market.

Columns (b) and (c) report the determinants of smallholder household’s total income. Results in column (b) indicate that participation in a tobacco scheme has a significant positive impact on the total income of households that selected to grow tobacco. The coefficient on \(\lambda_1\) shows a positive selection bias for total income for tobacco growers. In contrast, results in column (c) suggest that for smallholder farmers who selected not to grow tobacco, that decision had a negative impact on their households’ total income (the coefficient for \(\lambda_0\) shows a significant negative selection bias for nontobacco households). These results imply that the observed level of total household income for tobacco growers was higher than the level of total income that would be observed for the average household in this sample, had that household chosen not to grow tobacco. The implication is that participation in tobacco dominates any income-earning opportunities available to smallholder farmers, so that tobacco farmers are likely to earn more income than nontobacco farmers irrespective of the livelihoods strategy adopted by the latter.

<table>
<thead>
<tr>
<th>Explanatory variable</th>
<th>Coefficient</th>
<th>SE</th>
<th>Odds ratio</th>
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<tbody>
<tr>
<td>Constant*</td>
<td>-2.929</td>
<td>0.873</td>
<td></td>
</tr>
<tr>
<td>Age of household head</td>
<td>0.010</td>
<td>0.010</td>
<td>1.010</td>
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<tr>
<td>Farm size</td>
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<td>Adult equivalent population</td>
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<td>0.076</td>
<td>1.164</td>
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<tr>
<td>Nonfarm income*</td>
<td>-0.004</td>
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<td>1.000</td>
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<tr>
<td>Food crop production risk*</td>
<td>0.423</td>
<td>0.124</td>
<td>1.527</td>
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<tr>
<td>Tobacco storage risk*</td>
<td>-1.558</td>
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<td>Access to credit past year</td>
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<td>-2 log likelihood</td>
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<td>(\chi^2)</td>
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</tr>
</tbody>
</table>

*Variables significant at the 5% level or less are given in bold.

Columns (d) and (e) present the determinants of nonfarm income. The coefficient on \(\lambda_1\) shows a negative selection bias among households that selected to grow tobacco. In other words, participation in the tobacco program has a significant negative impact on the level of nonfarm income of households that selected to grow tobacco. In contrast, the coefficient for \(\lambda_0\) suggests that the decision not to grow tobacco had a significant positive impact on the nonfarm incomes of households in the control group. As such, the observed mean level of nonfarm income for tobacco growers was lower than the level of nonfarm income that would be observed for the average household in the sample that selected not to grow tobacco.

There are two possible interpretations of this result. It may be that since tobacco dominates other income earning opportunities, tobacco growers specialize in tobacco as the only source of income. Alternatively, the decision to grow tobacco can be viewed, in part, as a portfolio allocation decision, where a smallholder farmer chooses how much of a resource (e.g., household labor) to devote to two risky income earning opportunities (growing tobacco or nonfarm income earning opportunities). Participation in tobacco constrains the capacity of tobacco

<table>
<thead>
<tr>
<th>Variable (a)</th>
<th>Total income</th>
<th>Nonfarm income</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Tobacco (b)</td>
<td>Nontobacco (c)</td>
</tr>
<tr>
<td>Constant</td>
<td>1.012***</td>
<td>4.005***</td>
</tr>
<tr>
<td></td>
<td>(0.653)</td>
<td>(0.905)</td>
</tr>
<tr>
<td>Age of household head</td>
<td>-0.016***</td>
<td>0.002</td>
</tr>
<tr>
<td></td>
<td>(0.004)</td>
<td>(0.003)</td>
</tr>
<tr>
<td>Marital status household head</td>
<td>0.503***</td>
<td>0.259***</td>
</tr>
<tr>
<td></td>
<td>(0.130)</td>
<td>(0.069)</td>
</tr>
<tr>
<td>Gender of household head</td>
<td>-0.131</td>
<td>-0.155</td>
</tr>
<tr>
<td></td>
<td>(0.166)</td>
<td>(0.096)</td>
</tr>
<tr>
<td>Education of household head</td>
<td>0.127**</td>
<td>0.083</td>
</tr>
<tr>
<td></td>
<td>(0.057)</td>
<td>(0.036)</td>
</tr>
<tr>
<td>Adult equiv. population</td>
<td>-0.034</td>
<td>0.215***</td>
</tr>
<tr>
<td></td>
<td>(0.048)</td>
<td>(0.022)</td>
</tr>
<tr>
<td>Farm size</td>
<td>-0.156</td>
<td>-0.068</td>
</tr>
<tr>
<td></td>
<td>(0.151)</td>
<td>(0.084)</td>
</tr>
<tr>
<td>Farm capital</td>
<td>0.738**</td>
<td>0.391***</td>
</tr>
<tr>
<td></td>
<td>(0.054)</td>
<td>(0.031)</td>
</tr>
<tr>
<td>Microcredit club member</td>
<td>0.029</td>
<td>0.033</td>
</tr>
<tr>
<td>(\lambda_1)</td>
<td>0.719**</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.343)</td>
<td></td>
</tr>
<tr>
<td>(\lambda_0)</td>
<td>-0.009</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.008)</td>
<td></td>
</tr>
<tr>
<td>Adj. (R^2)</td>
<td>0.395</td>
<td>0.419</td>
</tr>
</tbody>
</table>

Standard errors are given in parentheses. ***, **, and * signify statistical significance at the 1%, 5%, and 10% levels, respectively.

households to earn nonfarm incomes, while the decision not to
grow tobacco frees households in the control group to use the
slack to diversify into nonfarm livelihood opportunities.

5.3. Impact of participation in tobacco on food security

Table 4 presents results on the determinants of household
food security. We use two measures of food security: the mean
value of the per capita food intake and the value of food pur-
burchases. Columns (b) and (c) highlight the impact of tobacco
participation on the value of household food consumption. The
coefficient on \( \lambda_1 \) shows a significant negative selectivity bias
among tobacco growers; the observed mean value of per capita
food intake among tobacco growing households should be lower
than the mean value of food intake that would be observed for
the average household in this sample, had that household chosen
not to grow tobacco. In contrast, the coefficient on \( \lambda_0 \) suggests
that the decision not to grow tobacco had no significant impact
on food consumption in the control group.

Table 4
Impact of tobacco participation on food security

<table>
<thead>
<tr>
<th>Variable (a)</th>
<th>Per capita food intake</th>
<th>Food purchases</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Tobacco (b)</td>
<td>Non-tobacco (c)</td>
</tr>
<tr>
<td>Constant</td>
<td>2.791***</td>
<td>1.464***</td>
</tr>
<tr>
<td>(0.582)</td>
<td>(0.479)</td>
<td>(0.983)</td>
</tr>
<tr>
<td>Age of household head</td>
<td>-0.014***</td>
<td>0.001</td>
</tr>
<tr>
<td>(0.003)</td>
<td>(0.002)</td>
<td>(0.005)</td>
</tr>
<tr>
<td>Marital status</td>
<td>-0.256***</td>
<td>-0.058</td>
</tr>
<tr>
<td>household head</td>
<td>(0.085)</td>
<td>(0.153)</td>
</tr>
<tr>
<td>Gender of</td>
<td>-0.191*</td>
<td>-0.177**</td>
</tr>
<tr>
<td>household head</td>
<td>(0.107)</td>
<td>(0.182)</td>
</tr>
<tr>
<td>Education of</td>
<td>-0.058</td>
<td>0.077**</td>
</tr>
<tr>
<td>household head</td>
<td>(0.038)</td>
<td>(0.063)</td>
</tr>
<tr>
<td>Adult equiv.</td>
<td>0.185***</td>
<td>0.005</td>
</tr>
<tr>
<td>population</td>
<td>(0.033)</td>
<td>(0.055)</td>
</tr>
<tr>
<td>Farm size</td>
<td>-0.361***</td>
<td>-0.035</td>
</tr>
<tr>
<td>(0.089)</td>
<td>(0.057)</td>
<td>(0.149)</td>
</tr>
<tr>
<td>Farm capital</td>
<td>-0.022</td>
<td>0.123***</td>
</tr>
<tr>
<td>(0.040)</td>
<td>(0.037)</td>
<td>(0.069)</td>
</tr>
<tr>
<td>Household income</td>
<td>0.235***</td>
<td>0.089***</td>
</tr>
<tr>
<td>(0.031)</td>
<td>(0.026)</td>
<td>(0.052)</td>
</tr>
<tr>
<td>Average maize price</td>
<td>-0.231***</td>
<td>-0.016</td>
</tr>
<tr>
<td>(0.030)</td>
<td>(0.023)</td>
<td>(0.051)</td>
</tr>
<tr>
<td>( \lambda_1 )</td>
<td>1.227***</td>
<td>-3.640</td>
</tr>
<tr>
<td>(0.241)</td>
<td>(0.405)</td>
<td></td>
</tr>
<tr>
<td>( \lambda_0 )</td>
<td>-0.004</td>
<td>0.023**</td>
</tr>
<tr>
<td>(0.008)</td>
<td>(0.011)</td>
<td></td>
</tr>
<tr>
<td>Adj. ( R^2 )</td>
<td>0.265</td>
<td>0.392</td>
</tr>
</tbody>
</table>

Standard errors are given in parentheses.***, **, and * signify statistical
significance at the 1%, 5%, and 10% levels, respectively.

Results presented in columns (d) and (e) show that a house-
hold’s tobacco participation status has some statistically signifi-
cant effect on the value of food purchases. While the coefficient
on \( \lambda_1 \) indicates that participation in tobacco has no statistic-
cally significant impact on food purchases the coefficient on \( \lambda_0 \)
shows a positive selection bias toward food purchases. In ad-
dition, the results also show that all else being equal, the value
of food purchases increases as the household’s total income
increases, and an increase in the adult equivalent population
will lead to greater food purchases. In contrast, both food con-
sumption and food purchases decline as the price of maize
rises.

The fact that participation in tobacco negatively affects
food consumption but has no significant effect on food pur-
burchases suggests that tobacco has a more negative impact on
the household’s ability to smooth consumption than to smooth
expenditure. In rural Malawi, under normal circumstances farm
households rarely rely on food markets for their subsistence
requirements. However, unlike other farm households, tobacco
households run down their food reserves faster because maize
is also used to pay for tenant and hired labor, especially during
the peak months of January and February, thus subjecting the
household to chronic and seasonal food insecurity (Diagne
and Zeller, 2001; Nankumba, 1989). With respect to expenditure
smoothing, notice that due to the lumpiness of tobacco income
and the long-time lag between the preparation of nurseries and
receipt of tobacco sales revenue, participation in this annual
cash crop ties up the farm households’ resources over much of
the cropping season, thereby reducing the household’s capacity
for expenditure smoothing.

5.4. Impact of tobacco income on food security

Although the preceding results are informative, they also
highlight the limitation of using participation to assess the ef-
cacy of anti-poverty policy. As argued earlier, underlying the
preceding analysis is an assumption that observed differences
in welfare outcomes between tobacco growers and nongrowers
are attributable to participation. However, this may be an unfair
assessment of the program because the logic underlying cash
crop liberalization was that growing tobacco would increase
household income which, in turn, would allow the household
to shore up food security through food purchases. Therefore, a
better test of the impact of liberalization would be to investi-
gate the contribution of tobacco income, and not participation,
to household food security.

Table 5 reports the impact of tobacco income on food pur-
burchases and per capita caloric intake in tobacco growing
households. Results in column (b) show that, all else being equal,
as tobacco and nonfarm incomes increase the value of food
purchases also rises. In addition, food purchases seem to rise
with the level of education of the head of the households while
they fall with the family size. However, results in column (d)
suggest that tobacco income has no impact on per capita caloric
intake. In contrast, just like in the case of food purchases, an increase in the household’s nonfarm income increases the per capita caloric intake.

The finding that nonfarm income has a larger impact on both food purchases and caloric intake accords with recent findings by Ellis (1998) and Bryceson (1999) about the role of nonfarm income in rural Africa. In other words, since tobacco income is lumpy and comes with a considerable time lag, it seems that over the cropping season even tobacco household have to rely on nonfarm income to smooth consumption and expenditure. In fact, due to its lumpiness, tobacco income is better suited for satisfying durable consumption and other financial exigencies that are characteristic of rural Malawi, such as the need for clothes, weddings, and other social ceremonies (which usually come after harvest). In Malawi’s urban areas, it is fairly common after tobacco sales have commenced to see long lines of cars, bicycles, stereo equipment, and other consumer durables displayed for sale outside commercial banks where tobacco farmers get their sales revenue.

6. Discussion and policy implications

When we use participation as a policy variable, we get mixed results. Whereas tobacco participation increases total household income, it has a negative effect on nonfarm income and no significant impact on food purchases. Similarly, we find that tobacco income, while marginally increasing household food expenditure, has no significant effect on the per capita caloric intake. However, in all tests, nonfarm income seems to be a more significant predictor of food security than tobacco income or participation. On the one hand, these results seem to confirm our earlier suspicion that although tobacco generates a lot of income and contributes toward increased household food expenditure, tobacco households either spend most of their income on luxuries or on foods with relatively lower caloric content. On the other hand, there is no conclusive evidence that either participation in this cash crop or incomes so derived negatively affect per capita caloric intake.

The general implication of these results is that the mere introduction of annual cash crop production opportunities into a subsistence-oriented agrarian system, while increasing income, will not necessarily achieve the ultimate poverty goal of food security. The preceding discussion suggests that the most serious obstacle to food security in rural Malawi lies not in the mere lack of income, but in the seasonality of income. In a subsistence system wholly dependent on rain-fed agriculture, seasonality means that returns to labor vary during the year and continuous household consumption needs are mismatched with uneven income flows. As Ellis (1998) notes, this would not constitute a problem if the household’s total income was sufficient to cover annual consumption requirements, or if the household had adequate crops in storage or savings that could be used to convert the unstable income into stable consumption or there was credit for consumption smoothing. However, in the absence of these preconditions, even the most successful cash croppers would be reluctant to wholly rely on rural food markets for their subsistence requirements.

In talking about Africa as a whole, there is always a danger to overgeneralization. Yet, we believe that our results raise two important issues for agricultural policy makers both in Malawi and Africa in general. First, if the effectiveness of cash crop liberalization is limited by seasonality of income and uncertainty surrounding rural food markets, and to the extent that reliance on food markets removes an important social insurance mechanism from the farm household, then agricultural liberalization and smallholder specialization should be geared toward market niches that provide some cash but do not threaten the household’s capacity for expenditure and consumption smoothing (Orr and Orr, 2002). It is important for policymakers to strike a balance between the promotion of annual cash crops and complimentary sources of income the seasonal cycles of which are not synchronized with the smallholder household’s cropping season. This two-track approach is both ideal and consistent with the recent literature on rural livelihoods which suggests that most farm households in developing countries already derive a significant portion of their income from off-farm sources and that this proportion of households is on the rise (Bryceson, 1999; Ellis, 1998).

Second, to achieve sustained rural poverty alleviation, it is important for policymakers to ensure that poverty alleviation programs engender mass participation and do not operate as income-generating enclaves with few linkages into the rural economy. For instance, due to difficulties inherent to rural credit markets and constraints that poverty and underdevelopment impose on the poor in participating and accessing benefits from a more liberalized economic environment, nationwide only 17%
of farm households have ever participated in the burley tobacco program (Orr and Orr, 2002). In fact, in the more densely populated but relatively land-constrained Southern Region, only 3% of farm households have ever participated in burley tobacco. For those left out, the benefits from tobacco liberalization are more likely to come from greater opportunities to hire out their labor and from increased demand for the goods and services that they provide, than from direct participation (Poulton et al., 2001). The challenge for policymakers is to design programs that increase the secure access to potentially productive assets and address structural rigidities in rural labor and product markets in order to create linkages to those who would otherwise not directly participate in the cash crop scheme.

7. Conclusion

Viewed in a historical perspective, the move to liberalize burley tobacco marked a profound shift in Malawi’s agricultural philosophy and strategy. Although this change in strategy was unequivocally necessary to jump-start the process of economic growth and rural poverty alleviation, our findings suggest that burley tobacco liberation, while increasing incomes, may not be sufficient to lever the poor out of poverty. When we take the farm household as a producer’s household that produces output using family resources, the evidence clearly shows that cash cropping opportunities allow the rural household to increase its crop and overall income. However, when we analyze the farm household as the consumer’s household, which allocates output and income in order to maximize household utility, then the common assertion of the comparative advantage literature—that markets allow households to increase their incomes by producing that which provides the highest returns to their productive resources and using the cash to buy consumption goods—is not quite borne out.

The principal contribution of this article is the finding that the lack of any significant link between cash cropping and food purchases in the cash crop producer’s household is not an artifact of cash crop liberalization. Although participation in annual cash crops does not negatively affect food security, it appears that due to seasonality and lumpiness of the income, increase in income due to cash cropping do not automatically translate into better capacity for expenditure and consumption smoothing.

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References


