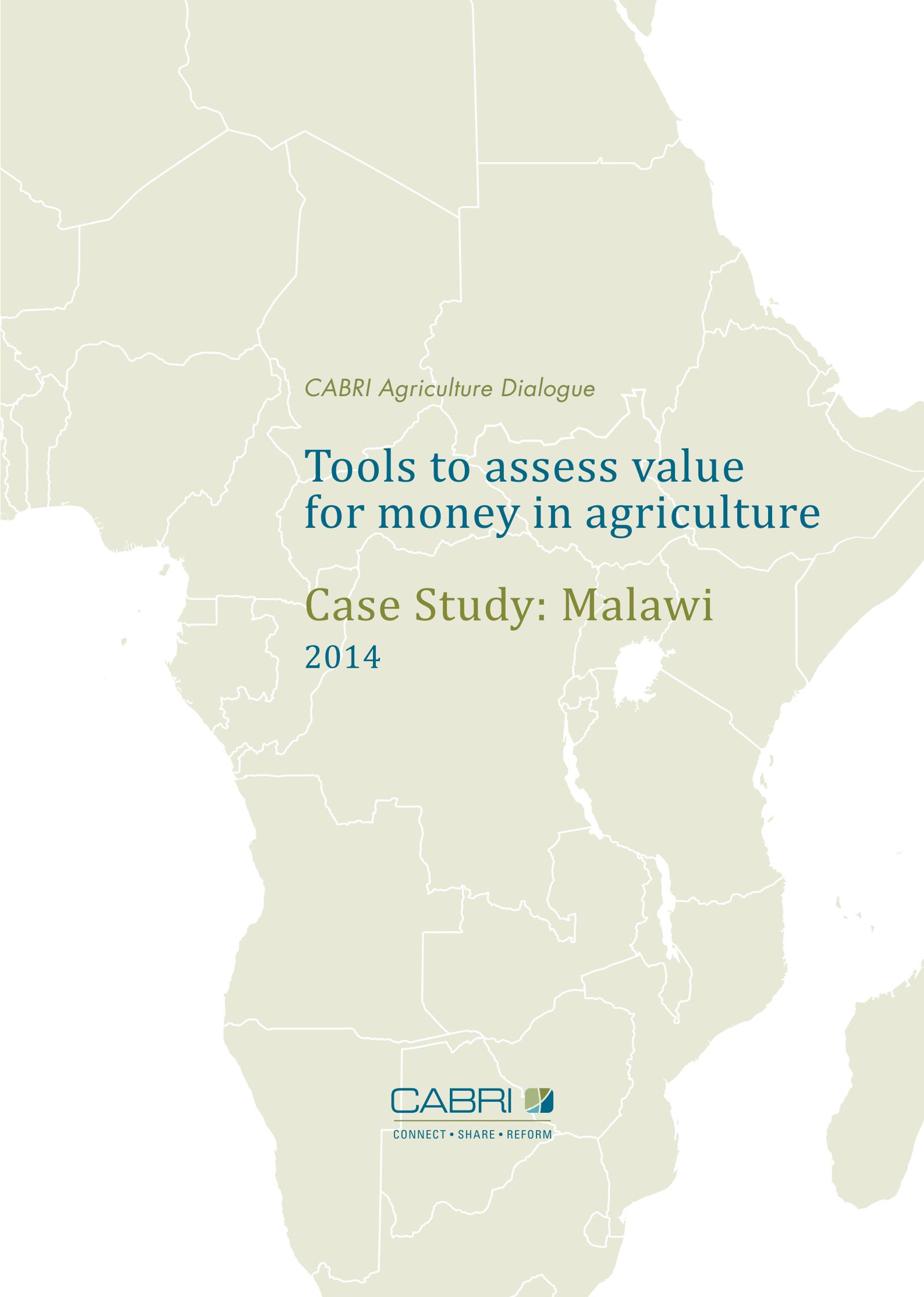


*CABRI Agriculture Dialogue*

# Tools to assess value for money in agriculture

Case Study: Malawi





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2014



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# Acronyms and abbreviations

|         |  |
|---------|--|
| ADMARC  | Agricultural Development and Marketing Corporation                 |
| ASWAp   | Agriculture Sector-Wide Approach                                   |
| CAADP   | Comprehensive African Agricultural Development Programme           |
| CBRLDP  | Community-Based Rural Land Development Project                     |
| DID     | difference in differences  |
| DfID    | Department for International Development, United Kingdom           |
| FAOSTAT | Food and Agriculture Organisation of the United Nations Statistics |
| FISP    | Farm Input Subsidy Programme                                       |
| GBI     | Green Belt Initiative  |
| GDP     | gross domestic product   |
| IFAD    | International Fund for Agricultural Development                    |
| IFPRI   | International Food Policy Research Institute                       |
| PSM     | propensity score matching  |
| SRFFM   | Smallholder Farmers Fertiliser Revolving Fund of Malawi            |
| USAID   | United States Agency for International Development                 |

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# 1. Introduction

The agrarian sector predominates Malawi's economy, accounting for one-third of its gross domestic product (GDP) and more than 80 per cent of its labour force (FAOSTAT 2013). The country's economic performance, therefore, is highly dependent on its agricultural sector. This dependence has created a policy environment that employs agricultural policy in an effort to reduce food insecurity and poverty in the country.

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**Malawi's agriculture is dominated by subsistence, rain-fed farming based around single households. The majority of farmers have limited access to land, and suffer from low crop yields as a consequence.**

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The difficulties Malawi faced when domestic maize production became insufficient to meet its food needs led to the creation and implementation of the Farm Input Subsidy Programme (FISP). Through the FISP, more than one million beneficiaries gained access to discounted fertiliser and seed (Dorward & Chirwa 2013). The programme was developed to reduce food insecurity, which has been the key item on Malawi's agricultural

policy agenda. However, in 2014 the country will need to import maize to provide humanitarian food aid to Malawian farmers who are unable to feed themselves.

Malawi's agriculture is dominated by subsistence, rain-fed farming based around single households. The majority of farmers have limited access to land, and suffer from low crop yields as a consequence. The government of Malawi has developed a resettlement programme with the intention of distributing land from large farming estates to farmers with less than two hectares of land in order to increase productivity and income with the ultimate goal of reducing poverty.

This case study highlights two agricultural initiatives to reduce poverty and food insecurity. We consider how the programmes have been evaluated to quantifiably measure their impact and the benefits they have achieved.

The rest of the case study is organised as follows: section 2 provides a background to Malawi and its agricultural sector. Section 3 describes the FISP, giving an overview of the programme's objectives and two independent impact evaluations of the programme. Section 4 describes the Community-Based Rural Land Development Project (CBRLDP), a resettlement programme implemented in Malawi, followed by a consideration of two independent evaluations of the programme that use different evaluation techniques and data.



## 2. Background

Malawi is a developing country in southern Africa with a population of 15.91 million. In 2010, 61.6 per cent of the population were reported as living on less than US\$1.25 a day. Malawi's economy is predominantly agricultural. According to the World Bank, in 2012, Malawi's agricultural sector contributed 30 per cent of the country's US\$4.3 billion GDP (World Bank 2012). Agriculture is Malawi's main source of employment and export income, accounting for 85 per cent of total employment and 90 per cent of the country's export earnings (FAOSTAT 2013).

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**Maize is the country's staple crop, constituting more than 50 per cent of the domestic food supply. Tobacco, on the other hand, is its main agricultural export product and cash crop.**

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Between 2008 and 2013, Malawi's agricultural labour force grew at almost the same rate as its population (3.09 per cent and 3.21 per cent respectively, FAOSTAT 2013). Pre-independence, the sector was an export-oriented estate-based system, but now it is dominated by small-scale producers around the country. Malawi is a net importer of cereals and other food. As of 2008, 80 per cent of farmers have been small-scale producers. Approximately 60 per cent of Malawi's farmers rely on subsistence agriculture, while 70 per cent of households have less than one-hectare of land. In 2013, 60 per cent of farmers working in the agricultural sector were women, and this percentage has been increasing since 1998 (FAOSTAT 2013). These small-scale producers have low exposure and access to technical inputs, which leads to low crop productivity (NSO 2010).

Despite being the main driving force of the economy, the agricultural sector in Malawi is quite concentrated in terms of its products. The two most important crops are maize and tobacco, and both are grown throughout the country by most smallholder farmers. Maize is the country's staple crop, constituting more than 50 per cent of the domestic food supply. Tobacco, on the other hand, is its main agricultural

export product and cash crop. Over the past decade, Malawi has become one of the leading tobacco producers in the world (Businessweek 2010). Malawi has a largely liberalised agricultural sector, but due to their importance the maize and tobacco sub-sectors regularly face policy interventions by the government. Introduced in 2005/06, the FISP was an intervention to increase maize productivity and reduce food insecurity. The repeal of the Special Crops Act of 1972 allowed small-scale producers to grow and sell tobacco;<sup>1</sup> and the CBRLDP aimed at reducing land constraints so that smallholder farmers could increase their crop productivity.

Malawian policy-makers have demonstrated an exceptional commitment to agricultural development by constantly improving existing policies for current situations. The government, in collaboration with various international organisations (the World Bank, European Union, African Development Bank, etc.) have launched numerous programmes to enhance Malawi's strengths and to tackle its weaknesses in the agricultural sector. Since the drought of 2004/05, food security has been Malawi's top domestic policy objective. The FISP dramatically changed Malawi's food security outlook, and developed into the backbone of a strongly country-owned plan to increase agricultural productivity and reduce reliance on imports. Through a consultative process with stakeholders, Malawi also developed an agricultural development programme (ADP),<sup>2</sup> and is now one of only a few countries meeting the spending and growth targets of the Comprehensive African Agricultural Development Programme (CAADP).<sup>3</sup>

<sup>1</sup> In terms of this law, tobacco producers had to obtain a licence from the Tobacco Control Commission to produce tobacco, and only estates and landowners were eligible to apply for a production licence. Growers also had to reach a certain production scale to be eligible to sell tobacco leaf directly on a government-monitored auction floor. Thus, many small-scale farmers and farmers who rented land were excluded from tobacco production.

<sup>2</sup> The ADP was developed to accelerate agricultural growth through efficient resource allocation. This development strategy was replaced in 2010 by the Agricultural Sector-Wide Approach (ASWAp).

<sup>3</sup> The CAADP is an Africa-owned, Africa-led initiative working to boost agricultural productivity in Africa. It encapsulates four main pillars: extending sustainable development and water control systems; improving rural infrastructure; reducing food insecurity; and investing in agricultural research and technology adoption.

Malawi has always been the victim of the low productivity of its agricultural sector, primarily due to the majority of farmers having particularly small land-holdings and low levels of human capital (Conway 2011). The drought in 2004/05 emphasised the vulnerability of the sector's almost entirely rain-fed production system (with less than 1 per cent of land irrigated), which is threatened increasingly by environmental degradation and climate change. Low productivity can also be attributed to the limited area under irrigation. As a consequence of the importance Malawi places on maize and tobacco, there is low crop diversification, which creates soil infertility and underdeveloped market structures.

Malawi's Agricultural Sector-Wide Approach (ASWAp) sets out the country's investment priorities to increase agricultural productivity, diversify production and raise rural incomes. The ASWAp's development and implementation involve a wide range of line ministries, including Agriculture, Irrigation and Water Development, Finance and Development Planning, Local Government and Rural Development, Natural Resources, Energy and Environment, Transport and Public Works, and Trade and Industry. The ASWAp has three focal areas: food security and risk management; agribusiness and market development; and sustainable land and water management.

The government, along with international donors, implements several programmes in the agricultural sector to promote higher productivity and diversified production:

- The Green Belt Initiative (GBI) aims to offer land to local and international investors, with a view to increasing agricultural production, productivity, incomes and food security. This initiative seeks to achieve and sustain an agricultural revolution in order to provide a sound footing for sustained economic growth and development. The

rationale of the GBI is to ensure that commercial farmers have access to large tracts of land for agriculture at the highest possible economies of scales. The GBI has faced criticism, mainly concerning the facilitation of local and foreign 'land-grabs' from smallholder farmers who own land designated for the GBI. The United Kingdom's Department for International Development (DfID) in collaboration with the Future Agricultures Consortium has published a policy brief outlining the policy and highlighting some of its potential drawbacks (Chinsinga & Chasukwa 2012).

- The International Fund for Agricultural Development (IFAD) is implementing the Smallholder Flood Plains Development Programme in Malawi to improve water control methods and soil quality for farmers in the flood plain region. It aims to increase crop productivity and improve human capital.
- Project Peanut Butter, designed by USAID, is an intervention intended to diversify crop production to include legumes and, at later stages, dairy products. The nitrogen-fixation quality of legumes will also help in improving soil fertility as it replenishes soil with vital nutrients and minerals.
- The World Bank, with the DfID, is in the process of implementing projects to improve financial and risk-management services for farmers by designing insurance and financial inclusion programmes.

The Malawian government has always emphasised agricultural research. Various projects, like the FISP, have been thoroughly documented and evaluated by numerous international organisations and researchers. The two sections that follow focus on the FISP and the CBRLDP, and discuss in detail how they were implemented and evaluated.

### 3. The Farm Input Subsidy Programme

The FISP is Malawi's main support programme and has substantially influenced the country's agricultural sector. It provided for input subsidies to the vast majority of producers of maize (and other crops, including legumes and cotton. The programme reached 65 per cent of all farmers (over 1 million beneficiaries) in 2008/09 (Dorward & Chirwa 2013).

The FISP was envisioned as a rationed and targeted programme that would involve the partial subsidy of a much larger volume of inputs than was provided under the previous Starter Pack and Targeted Input Programmes.<sup>4</sup> It targeted smallholder farmers who owned land and were legitimate residents of their villages. Village heads and members of village development committees selected beneficiaries, and were supposed to give priority to 'vulnerable' groups (Chibwana & Fisher 2011).

Vouchers or coupons (inclusive of transport costs and farmer redemption payments) were used to target approximately 50 per cent of farmers in the country to receive fertilisers and improved seeds for maize production. 'Maize fertilisers' were provided in a package of one voucher for a 50 kg bag of fertiliser and one voucher for a 50 kg bag of urea for top dressing.<sup>5</sup> Initially, open-pollinating varieties of maize were subsidised under the programme but, as the programme evolved, greater emphases were placed on hybrid seed varieties. Chemicals to improve grain storage were provided from 2007 onwards, and cotton hybrids were provided in various other years. Local government structures were used to distribute the first 2 million fertiliser coupons to farmers in rural areas; these were supplemented by an additional 600 000 coupons. The government procured fertiliser through international tenders and local purchases from importers. All subsidised fertilisers were sold through distributors. The programme cost MK7.2 billion (over US\$17 million in current US\$), and sold around 130 000 tons of fertiliser (Dorward &

Chirwa 2013). The ASWAp mentions expanding these inputs to include some investment in a nationwide set of on-farm trials of different integrated soil fertility management technologies.

The Malawian government, various international organisations and researchers have evaluated the FISP at different times. The purpose of the evaluations has been to provide the Malawian government and other stakeholders with information on the implementation and impact of the FISP. Results were quantified by using baseline and post-intervention data to observe the impact the programme had on the agricultural sector. Maize producers increasingly benefited from lower production costs through the introduction and expansion of the FISP. The programme was modified after each evaluation, and what started out as an input subsidy programme for all farmers became a targeted input programme to boost yields for small farm producers, and later went on to include a price support scheme. The success of this programme has led to a similar programme being implemented in Kenya, focusing on smart subsidies to tackle food insecurity.

By presenting a logically linked sequence, a results chain serves as a roadmap for how desired progress toward a targeted development goal can be achieved. It aims to answer the following questions:

- What are the inputs of the FISP?
- What activities were conducted using these inputs?
- What are the intermediate outcomes?
- What are the final outcomes?

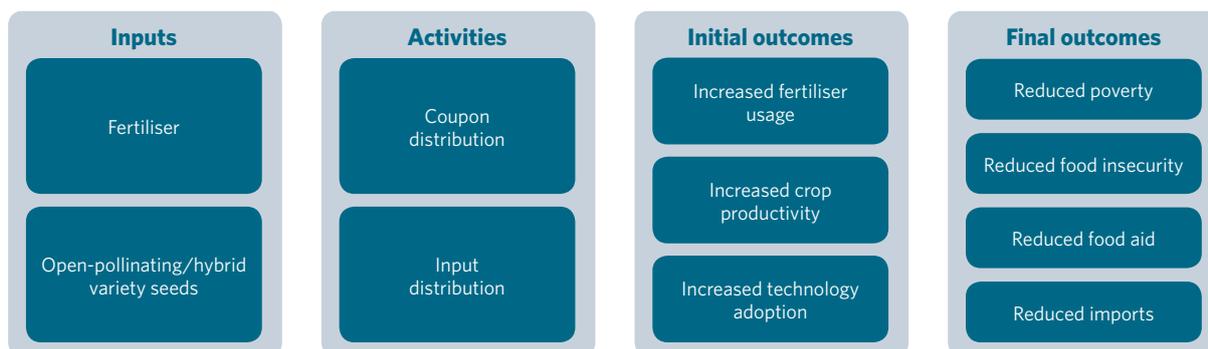
A results chain graphically represents a process from inputs and activities to intermediate outcomes and longer-term results. Figure 1 summarises the mechanism through which the FISP works.

In the results chain, the FISP has two main inputs, fertiliser and high-yielding or open-pollinating seeds. Coupons are distributed to farmers, which they later redeem at various distribution centres for fertiliser, urea for top dressing and seeds. These inputs and activities lead to certain outcomes, some of which (initial outcomes) occur in the short run and some of which (final outcomes) occur in the long run. The FISP

<sup>4</sup> In the 1990s, fertiliser price subsidies to smallholder farmers were replaced by a universal Starter Pack and later a Targeted Input Programme (TIP) for the free distribution of small fertiliser and seed packs to smallholder farmers. This programme (documented by Levy 2005), which adopted systems that involved private distributors of seed and fertiliser, was continued until 2004/05.

<sup>5</sup> Top dressing is a layer of manure or fertiliser placed on top of unploughed soil to improve soil quality.

Figure 1: Results chain of the Farm Input Subsidy Programme



is expected to increase fertiliser usage as a result of the subsidy, and thereby lead to increases in productivity. In the long run, increased productivity in the agricultural sector is expected to translate into reduced poverty, reduced food insecurity and reduced imports.

By looking at the results chain, one can conceptualise what to expect from an evaluation measuring the impact of the FISP. We expect poverty and food insecurity to decrease, and this will happen through increases in fertiliser usage and in agricultural productivity. Performance indicators based on the results chain can be selected, and impact evaluation questions can be formulated, such as what impact the FISP has had on poverty. The results chain allows the evaluator not only to understand whether the programme has been successful but also the reason behind its success or failure. If the FISP failed to achieve its intended outcomes, was it because there was no increase in fertiliser usage? Was it because the increase in fertiliser usage did not lead to increases in productivity? The two subsections that follow summarise two impact evaluations that seek answers to such questions.

### 3.1 Impact evaluation I: Difference in differences

In this impact evaluation, Dorward and Chirwa (2013) used a regression-based approach to study the direct impacts of the FISP on a number of performance indicators. These performance indicators are in line with the results chain illustrated in Figure 1, and included maize production, food consumption, measures of well-being in terms of education and health services, and variables measuring the overall welfare of households, such as real income.

#### Exercise

- Discuss how and why each of these performance indicators is relevant to the FISP.
- Describe the mechanism through which the performance indicators may change as a result of implementation of the FISP.

The authors used a collection of panel data in the periodic evaluation of the subsidy programme. Data were collected

from two main sources: implementation records on the subsidy programme, to identify the participants and non-participants in the programme; and household and input supplier surveys. Information on the outcome variables and the control characteristics were derived from these surveys. The survey design allowed the authors to follow the same households from the pre- to the post-intervention period and to estimate the impact of the subsidy programme on households that were direct beneficiaries of the programme, compared with non-beneficiaries, over time.

#### Exercise

- Given the implementation design of the FISP and the data collected, what would be the best way to evaluate this programme?
- Which impact evaluation technique should be deployed to arrive at an estimate of the programme's impact?

Starting in 2006/07, annual evaluations of the programme were led by an evaluation team. Interim evaluations were conducted to provide intermediate feedback on how the programme was progressing. In the 2006/07 round of evaluations, 3 298 households were surveyed across all districts in Malawi. The survey provided information on households that were direct beneficiaries of the FISP (i.e. had access to subsidised inputs) as well as households that used unsubsidised inputs. Production-based performance indicators (cereal production, cereal yields) were not successfully measured in these rounds of data collection, and did not allow the authors to estimate the impact of the programme on production-based outcomes. Qualitative data from interviews and focus-group discussions supplemented the quantitative data and provided further insight and filled gaps in the latter. In 2008/09, data were collected from 1 982 households across 14 districts. Data from 760 households across eight districts were collected in 2010/11.

Annual surveys of the households were linked over time so that there was a balanced panel of 461 households over a period of six years (2006–2011). A second analysis (of 227 households) was conducted using a smaller sample consisting of poor households only. The idea was to build a sample of

households that were similar to each other pre-intervention in order to overcome selection issues.

DID methodology was used to estimate the direct impact of the programme. Households were categorised into five groups depending on how many times they received subsidies during the period 2006–2011. The first group was the control group, which consisted of households that never received subsidies. The other four groups were treatment groups made up of households that accessed subsidies one or two times, three or four times, five times and six times, respectively. Households that had access to subsidies for longer periods of time were expected to have better performance indicators than the control group and treatment groups with less access to the subsidies.

### Exercise

- What are the strengths of DID methodology?
- What are the weaknesses of this approach?
- What alternative method could have been used to estimate the programme's impact?

The DID approach used in this paper is different from a textbook DID formulation in two respects. Firstly, there is no single treatment year; households are in and out of the programme multiple times during the period of analysis. A household that is a participant in year  $t$  may become a non-participant in year  $t+1$ . Secondly, there is more than one treatment group in the sample, and one would expect to see different impacts of the programme on each of these groups, as they are categorised in terms of the intensity of support they receive. Hence, a simple graphical representation or a simple formulation of the programme's impact is not possible in this case.

This impact evaluation is a good example of quantitative analysis being supplemented by qualitative analysis. The second approach used to investigate direct beneficiary effects was a qualitative assessment based on focus-group discussions, key informant interviews and life stories of some

beneficiaries collected in the years 2006/07, 2008/09 and 2010/11.

Both the short-run and the long-run impacts of the programme were estimated. The main findings are summarised in Table 1.

The authors found that the receipt of a subsidy had current season impacts on maize production, net crop income, food consumption and household income. The models used to examine the direct subsidy impacts on indicators such as school enrolment and child health did not allow the authors to assess immediate impacts separately from lagged impacts.

In Table 2, estimates of the impact of the FISP on food consumption are reported. The first model (1) uses the four dummy variables, which measure how many times households received a subsidy. According to this first specification, households that received a subsidy six times had a 21.63 per cent higher food consumption than those that never received a subsidy. This effect is significant at the 5 per cent level, as indicated by the calculated t-statistic (2.23). All the other dummy variables are insignificant, implying that receiving a subsidy less than six times does not make a significant difference in terms of food consumption. The second model (2) uses the quantity of subsidised fertiliser as the explanatory variable. This variable has a positive (0.0007) and a significant (t-statistic of 2.27) coefficient, implying that food consumption goes up as the quantity of subsidised fertiliser increases. All in all, the programme has a positive and a significant impact on food consumption.

This impact evaluation involved international collaboration between the government of Malawi and a team of academics from the University of London. The Malawi Ministry of Agriculture and Food Security and the DfID provided both access to critical information about the programme and the resources to study it. The Future Agricultures Consortium provided financial support.

Table 1: Summary of findings on direct subsidy impacts

|                       | Current season impacts | Lagged season impacts | Wider seasonal changes |
|-----------------------|------------------------|-----------------------|------------------------|
| Maize production      | +ve                    | +ve                   | +ve                    |
| Net crop income       | +ve                    | X                     | +ve                    |
| Food consumption      | +ve but limited        | +ve but limited       | +ve for 2006/7 & 8/9   |
| School enrolment      | ?                      | +ve                   | +ve                    |
| Child health          | ?                      | +ve                   | +ve                    |
| Subjective well-being | Mixed (+ve, X)         | X                     | +ve                    |
| Household income      | ?, +ve                 | ?                     | ?                      |
| Physical assets       | X                      | Mixed (weak +ve, X)   | +ve                    |
| Shocks                | +ve*                   | +ve*                  | -ve                    |

Notes: \* Possible reverse causality.  
+ve: evidence for positive change; X: evidence does not suggest change.  
-ve: evidence for negative change; ?: lack of evidence.

Source: Dorward & Chirwa (2013)

Table 2: DID estimates of impact on food consumption

| Dependent variable = 1 if household had adequate or more food in the past month of the survey | 1              |        | 2              |        |
|---|----------------|--------|----------------|--------|
|   | All households |        | All households |        |
|   | $\beta$        | t-stat | B              | t-stat |
| Dummy for 2006/7 survey   | 0.1001         | 1.6    | 0.1132         | 4.19*  |
| Dummy for 2008/9 survey   | 0.3345         | 4.14*  | 0.3857         | 13.48* |
| Dummy for 2010/11 survey  | -0.0934        | -1.09  | 0.0331         | 1.04   |
| Quantity of subsidised fertiliser (kg)  | -              | -      | 0.0007         | 2.27** |
| Dummy received subsidy 1-2 times  | 0.0386         | 0.61   | -              | -      |
| Dummy received subsidy 3-4 times  | 0.1173         | 1.34   | -              | -      |
| Dummy received subsidy 5 times  | 0.1758         | 1.45   | -              | -      |
| Dummy received subsidy 6 times  | 0.2163         | 2.23** | -              | -      |
| Durable assets (MK '000)  | 0.0001         | 0.29   | 0              | 0.14   |
| Logarithm of land (hectares)  | -0.0033        | -0.33  | -0.0047        | -0.42  |
| Dummy male-headed household   | 0.046          | 0.82   | 0.0428         | 0.94   |
| Age of household head (years)   | 0.0001         | 0.08   | 0.0002         | 0.14   |
| Years of education household head (years)   | 0.0084         | 1.32   | 0.0067         | 0.95   |
| Constant  | 0.3953         | 4.73*  | 0.3963         | 3.83*  |
| Number of observations  |                |        | 1 844          | 1 844  |
| Number of households  |                |        | 461            | 461    |

Note: \*, \*\* and \*\*\* denote statistical significance at 90 per cent, 95 per cent and 99 per cent confidence levels respectively.

Source: Dorward & Chirwa (2013)

### 3.2 Impact evaluation II: Qualitative impact evaluation

The primary objective of the FISP is to reduce food insecurity by providing farmers with input subsidies; a secondary objective of the programme is to develop a reliable input distribution system. Kelly, Boughton & Lenski (2010) aim to measure the impact of the FISP on input supply and the development of the private sector's input supply systems between 2007 and 2009.

**The survey used a combination of qualitative and quantitative questions, and included open-ended questions about the advisability of continuing the subsidy programme and recommendations for improving it.**

Data for this qualitative evaluation came from various sources, such as past reports on Malawi's input sector, key informant interviews with fertiliser importers, seed producers and importers, government administrators, distributors of seed and fertiliser, the Agricultural Development and Marketing Corporation (ADMARC) and the Smallholder Farmers Fertiliser Revolving Fund of Malawi (SFFRFM), and a survey of 271 retail outlets in six districts of Malawi. The retailer survey included a tabulation of characteristics of the

full population of input outlets in each of the six districts covered by the survey and a description of the sample selected by type of retail outlet. Heterogeneous groups such as agro-dealers were over-sampled and homogenous groups like ADMARC and SFFRFM were under-sampled due to their more homogenous structure.

This evaluation does not apply any quantitative econometric analysis. Data coming from interviews and focus-group discussions are presented to the reader with some simple summary statistics. More importantly, the reasons why agents responded differently to various questions are explored. Although simple, the analysis provides valuable insight into how the FISP may affect the input supply sector.

#### Exercise

- Discuss the implications of the fact that data were collected from six districts of Malawi and do not cover the whole country.

The first part of the evaluation was the analysis of trends in sales by different agents for the period 2003–2006. The objective was to discover which agents experienced increases or decreases in sales and what their opinions were on the cause of these changes (subsidy, climate, local programmes/projects, changes in personal situations, government policies, etc.). Collecting data on profits over several years was not feasible, and the authors settled for collecting information on

perceptions about trends in profits from importers/distributors and retailers, and combining this with information offered about the reasons for these changes, in order to see how much credit the subsidy is given for change. Kelly et al. (2010) find that distributors who were left out of the programme expected to see lower sales and returns. Data from interviews and focus-group discussions delve deeper into the reasons for expecting lower sales as a result of exclusion from the programme. Different agents cited different reasons for their expectations.

Information was also collected on the impact of the subsidy programme on costs and cash-flow structures. This information is used to identify incentives and disincentives for importers, distributors and retailers to participate in the programme. The authors use entry as an indicator of confidence in the sector and exit as an indicator of declining

incentives to assess confidence in the system. Agents were asked to identify the current and potential benefits of the FISP to themselves, to others in the input sector, to farmers and to Malawian citizens, in general.

The survey used a combination of qualitative and quantitative questions, and included open-ended questions about the advisability of continuing the subsidy programme and recommendations for improving it. The authors used this information to compile a list of recommendations on how the programme should be redesigned to improve its effectiveness and efficiency.

This report was published in 2010 after evaluating the FISP project in multiple years. It was undertaken by the Malawian Ministry of Agriculture, which assisted in providing information for the compilation of the report. The DfID, USAID and the Future Agricultures Consortium funded the evaluation.



## 4. The Community-Based Rural Land Development Project

In Malawi, smallholder farmers make up over 75 per cent of the agricultural sector's farmers (FAOSTAT 2013). Smallholders often have less than one hectare of land to farm on and live in primarily rural areas. In 2002, a new national land policy was adopted by the government of Malawi to reverse historical land issues and inequality. This created a favourable environment for the development of the Community-Based Rural Land Development Project (CBRLDP), which launched between 2003 and 2007. Its particular focus was to reduce unequal land distribution, land market failure and land administration weakness, while supporting decentralisation, community participation and programmatic approaches.

The CBRLDP was a collaborative effort of the World Bank and the Malawian government to increase the agricultural productivity and income of about 15 000 poor rural families through the implementation of a decentralised, voluntary, community-based land reform programme (World Bank 2012). They evaluated the project by discerning the increase in the real income and agricultural productivity of participating families as compared to those of control groups and such families prior to the project.

The approach to land reform piloted under the project includes: voluntary acquisition by communities of land sold by willing estate owners, transferred to communities by the government or donated by private individuals; on-farm development, including the establishment of shelter and the purchase of basic inputs and necessary advisory services; and land administration, namely the regularisation, titling and registration of beneficiaries' property rights in land.

The project had the following four components. Component I was implemented with direct community involvement in the identification of suitable land and negotiation for its acquisition, and the preparation of farm development proposals. Community proposals for acquiring land and farm development were reviewed and approved – taking into account legal, technical, environmental and poverty-reduction criteria – by a district-level multi-stakeholder entity. Under Component II, secure titles were provided to the beneficiaries. The communities decided under what property rights regime they wished to register their land and how to distribute land among

participating households, which could include the registration of individual plots, if requested by the community. Component III financed public information campaigns, community mobilisation, participatory rural appraisal, training and technical support to communities, district and national participating institutions and stakeholders. Component IV financed project administration, co-ordination, supervision, monitoring and evaluation.

The CBRLDP was designed to address emerging social conflict related to unequal access to land by piloting a government-assisted, community-driven programme to transfer land to land-deprived small-scale farmers.

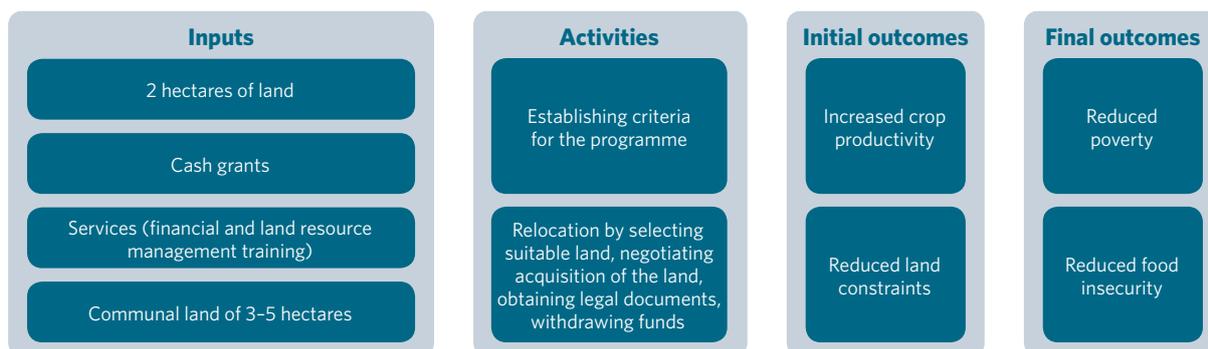
Household eligibility depended on Malawian citizenship, land impoverishment and food insecurity. As part of the programme, each household received two hectares of land, a cash grant and access to services. In addition to their own allocation, households had access to 3 to 5 hectares of communal land shared among the beneficiary group members, and received a group level title deed that was signed by all members. The cash grant amounted to US\$1 050 per household, typically allocated to farm development (62 per cent), land purchases (30 per cent) and a resettlement allowance (8 per cent).

The results chain depicted in Figure 2 helps us to think more analytically about cause and effect, and aims to provide answers to the following questions:

- What are the inputs of the CBRLDP?
- What activities were conducted using these inputs?
- What are the intermediate outcomes?
- What are the final outcomes?

The CBRLDP has four main inputs: land for each household; cash grants; services; and communal land. The project was piloted in four southern districts – Mulanje, Machinga, Mangochi and Thyolo. Coincidentally, Mulanje and Thyolo are the main tea-growing areas of the country, with most of the good arable land under tea estates, owned largely by foreign investors. These inputs and activities lead to certain outcomes, some of which (initial outcomes) occur in the short run, and some of which (final outcomes) occur in the long run. The

Figure 2: Results chain of the Community-Based Rural Land Development Programme



programme is expected to increase crop productivity via the increase in land available per farmer. This will lead to an increase in income in the short run. In the long run, the increase in productivity and income in the agricultural sector is expected to translate into reduced poverty, reduced food insecurity and reduced imports.

By looking at the results chain, one can conceptualise what to expect from an evaluation measuring the impact of the CBRLDP. We expect poverty and food insecurity to decrease, and this will happen through an increase in hectares per farmer and an increase in agricultural productivity. Performance indicators based on the results chain can be selected and impact evaluation questions can be formulated, such as: What was the impact of the CBRLDP? Was it successful in achieving its goals and how do we measure this?

#### 4.1 Impact evaluation I: Difference in differences with matching

Simtowe, Mendola and Mangisoni (2010) use a combination of qualitative and quantitative data, with data sources including a literature review/desk research and panel data collected from a sample of households. Other data sources were quarterly progress reports, ministry of lands physical planning surveys, the World Bank interim project evaluation report and implementation reports regarding resettlement. The use of qualitative methods helped fill gaps in data in cases where the quantitative data were inadequate. The various data sources ensured the triangulation and verification of results, which improved the robustness of the findings.

The panel data used for the quantitative econometric analysis were a balanced panel covering a period of four years. Households from six districts were surveyed over the four-year period. After excluding households that dropped out of the survey during this time, the researchers were left with a balanced panel of 1 194 households.

Households were assigned to one of the three treatment groups or the control group. The first treatment group consisted of households that were direct beneficiaries of the programme. There were 391 observations in this first group. The second treatment group consisted of 190 households that were left behind in vacated areas and which partially and indirectly benefited from the programme as a result of more

land being available per household. The third treatment group consisted of 214 households located in receiving areas and which the programme partially and indirectly affected. The control group was comprised of 397 households in areas where no direct or indirect impacts of the programme were realised.

Treatment groups were compared with other treatment groups and the control group, and average treatment effect was calculated using the DID estimation method. DID on its own does not alleviate selection bias. The methodology relies on the assumption that the control and treatment groups would evolve in the same way in the absence of the programme. This assumption holds if households in the control and treatment groups were similar before the implementation of the programme in terms of control characteristics that have an effect on the dynamics of the outcome variable.

#### Exercise

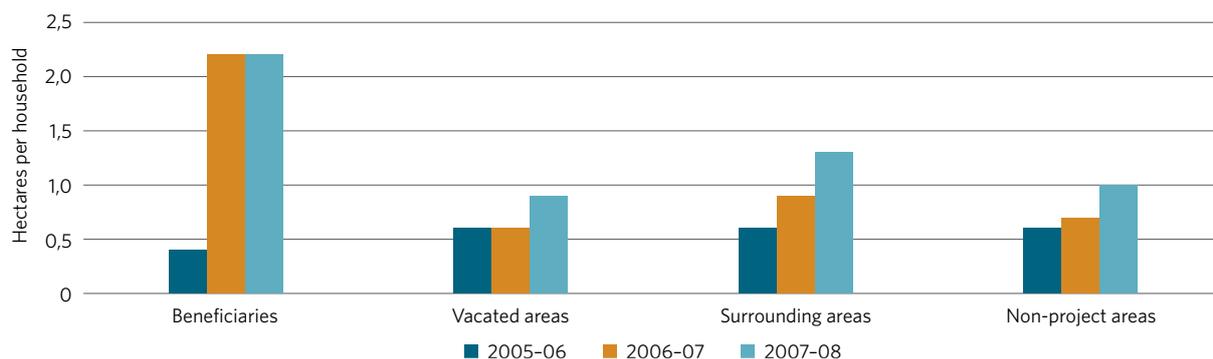
- How can we ensure that the treatment and control groups are similar to each other in terms of pre-treatment characteristics?
- What other method could be used along with DID to ensure ‘balancedness’?

In order to ensure that, Simtowe et al. (2010) do propensity score matching (PSM) before applying DID. Households are matched on certain characteristics, and each household in the control and treatment groups is assigned a weight on the basis of its propensity score. These weights are then incorporated into the DID estimation.

The three types of treatment outlined above allowed the authors to measure direct and indirect effects of the programme. Households that were not direct beneficiaries but were located in areas indirectly affected by the programme were compared with the direct beneficiaries and those who were not affected by the programme at all.

The evaluation and impact assessment demonstrated that the majority of households that benefited from the land acquisition were relocated in Mangochi and Machinga from within the two districts, a few were relocated from Mulanje and Thyolo, and very few were relocated in Balaka and Ntcheu.

Figure 3: Average household land-holding



Source: World Bank (2009)

By December 2009, 14 144 households had been relocated onto 31 255 hectares, representing 94 per cent and 95 per cent of the project’s targets, respectively.

Figure 3 indicates that land-holding sizes changed substantially in all the sampled categories after relocation. Land-holding sizes for the beneficiaries before resettlement was lower (0.4 hectares) than for the three control groups, suggesting that the selection criteria used led to the selection of eligible, land-poor individuals.

#### Exercise

- Which treatment group was most affected by the intervention?
- Is this result in line with your expectations?

This report was produced by Franklin Simtowe (agricultural economist at the International Crops Research Institute for the Semi-Arid Tropics), Mariapia Mendola (professor at the University of Milano-Bicocca) and Julius Mangisoni (associate professor at the University of Malawi) and was published in 2010. The evaluation was carried out on behalf of a consulting firm, Italtrend, which was contracted by the Malawian government.

## 4.2 Impact evaluation II: Difference in differences with matching

Mueller et al. (forthcoming) studied the impact of the CBRLDP on a set of performance indicators, including measurements of agricultural production and household consumption. Participants, who resettled in Machinga and Mangochi (the long-term treatment group), were followed for long-term evaluations between 2006 and 2011. Non-participants living in the adjacent Balaka and Chiradzulu districts (the long-term control group) were also followed for the same period. The impact evaluation is based on comparisons between 220 treated and 333 control households in adjacent districts during the 2006 (baseline) and 2011 surveys.

The authors used a difference-in-differences matching estimator to calculate impact on those who participated in the resettlement programme in comparison to those who did not. The resulting estimate is the treatment-on-the-treated

estimate, as the treatment group consisted of households that actually benefited from the programme.

Since households volunteered for the resettlement programme, participation was not random and, therefore, posed a problem in measuring the long-term impacts of the CBRLDP. A simple comparison of the outcomes of participants and non-participants could have produced biased estimates due to the self-selecting nature of the programme. Supposing that participating households were poorer or less skilled than non-participating households, we might attribute negative impacts to the resettlement programme when, in fact, the effects were being driven by unobservable sample differences. To reduce the potential for this form of bias the authors used a PSM technique comparing the outcomes of programme participants with similar non-participants using a set of observable characteristics (Abadie et al. 2004).

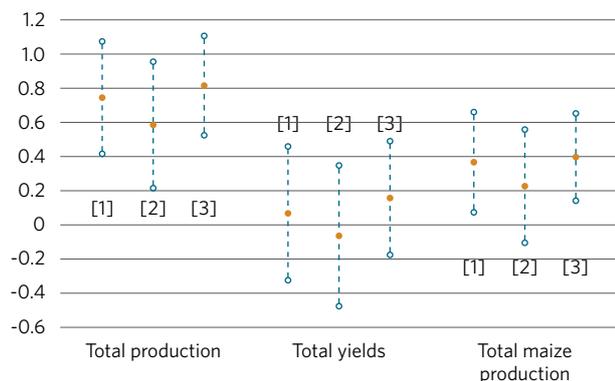
Three different matching procedures were applied to ensure robustness. The first one was a nearest-neighbour matching, where each household in the treatment group was matched with two of its nearest neighbours in the control group; the second was a nearest-neighbour matching with the trimmed sample; and the third entailed propensity scores being used directly to weight observations (along the lines of Hirano, Imbens & Ridder 2003). The difference-in-differences matching estimator was used to reduce additional bias due to a time-invariant characteristic, such as a household head’s farming ability.

#### Exercise

- What are the strengths of using DID with matching?
- What are the weaknesses of and difficulties with using this approach?

Figure 4 presents three estimates from the three matching procedures for the impact of resettlement on long-term production, along with their 95 per cent confidence intervals. The authors find that the resettlement programme increased the total production of treated households by between 59 per cent and 82 per cent in the long term, but did not find robust differences in total yields. They, therefore, attribute the benefits largely to the expansion of farm size.

Figure 4: Resettlement impact on long-term production



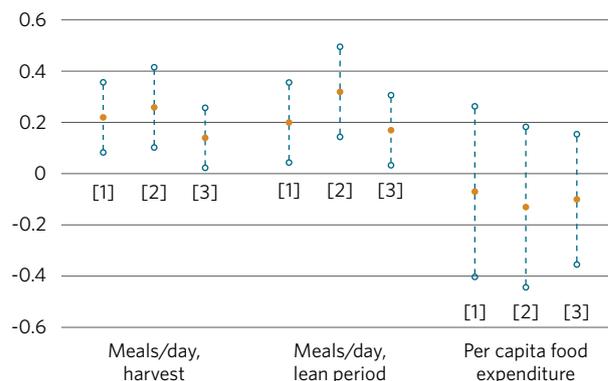
Source: Mueller et al. (forthcoming)

The authors also find that the improvements in production translated into a greater number of meals consumed per day during the harvest and lean periods over the long term. However, this improvement in production was not manifested in greater per capita food expenditure (see Figure 5). The authors find that resettlement households diversified their crop portfolio, growing a greater percentage of pigeon peas, groundnuts and tobacco than the control households.

#### Exercise

- Discuss how each of the performance indicators below is related to this programme:
  - total production;
  - total yields;
  - total maize production;
  - meals per day; and
  - per capita food expenditure.
- Using the results chain provided in Section 4, describe the mechanism through which these performance indicators are affected by the implementation of the CBRLDP.

Figure 5: Resettlement impact on long-term consumption



Source: Mueller et al. (forthcoming)

In addition to production and food security, the authors examine the impact the programme has had on property rights, and find different impacts by gender.

This impact evaluation was the product of an international collaboration between IFPRI, the World Bank and the government of Malawi. IFPRI conducted a survey in August 2011 to complement a panel survey conducted between 2006 and 2009 to evaluate the CBRLDP (Chibwana & Fisher 2011). Consultants commissioned by the World Bank and the government of Malawi collected the previous rounds.

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