Initial consideration of approaches and methods for estimating wider FISP contributions

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December 2010

Summary

This paper provides an initial consideration of possible approaches and methods for estimating the wider contributions of FISP to growth, poverty reduction and resilience.

Previous estimates of the economic benefit cost ratio have only examined producer benefits and have noted but not explicitly estimated the wider indirect benefits of, for example, lower maize prices to consumers. Estimates of these wider indirect benefits will be developed and 'triangulated' using information from livelihood and rural economy model simulations and from estimates of consumer surplus. Both of these methods require estimation of key parameters and, given difficulties in making precise estimates, will provide ranges in estimated returns under different assumptions.

These estimates will both feed into and benefit from data collection and analysis to estimate direct and indirect impacts of the programme on incomes and poverty reduction, vulnerability and resilience, and marginalisation and exclusion. This work will involve gathering of a third round of household and community survey data with focus group discussions. Analysis of the new household survey data with panel data from previous survey rounds will be augmented by data collection on some new variables. Poverty incidence will be estimated using seasonally adjusted WMS models. Information on income from different sources and on asset holdings will provide indicators on welfare changes, and with consideration of diversification of income and asset portfolios, will also provide indicators on changes in vulnerability and resilience. This will be augmented by analysis of panel data on the incidence, severity and effects of shocks and stresses recorded in the different surveys.

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1 Introduction

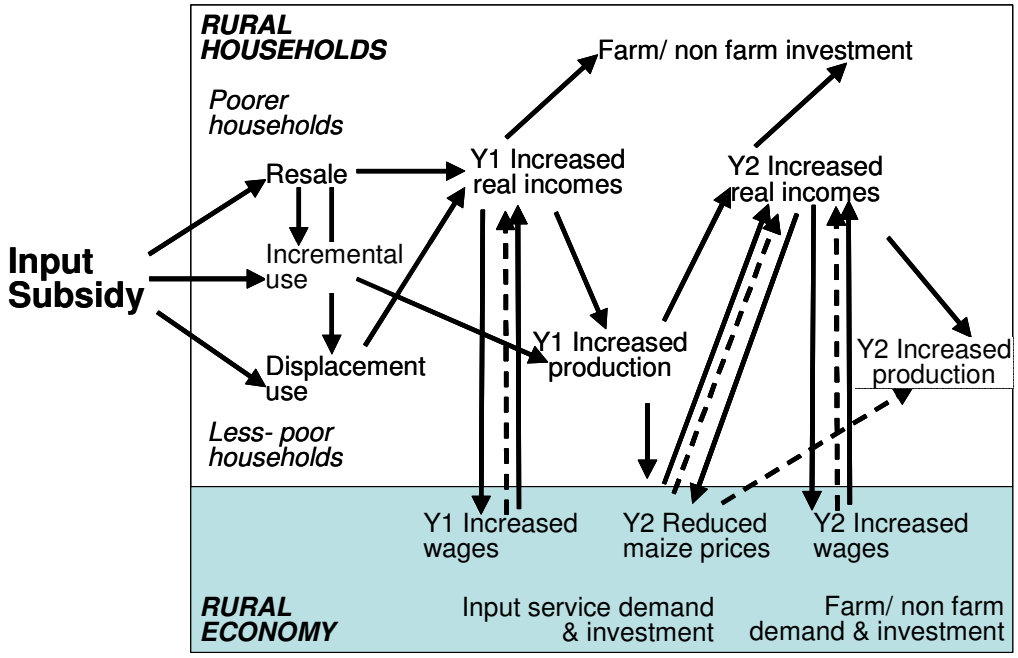
This paper provides an initial consideration of possible approaches and methods for estimating the wider contributions of FISP to growth, poverty reduction and resilience. Previous evaluations (see for example SOAS et al 2008; Dorward et al 2010a) have provided a narrow estimation of the benefit: cost ratio in terms of the value of the incremental production to direct beneficiary households: wider consumer surpluses and linkages arising from the programme have been recognised as important but have not been explicitly estimated. This paper puts forward possible methodologies and approaches for estimating some of these. It also discusses ways for improving estimation of incremental incomes and poverty reduction arising from the programme and for providing some indicators of ways in which the programme may increase the resilience of smallholder farmers, both beneficiaries and non-beneficiaries. The paper does not attempt to provide any estimates of these indicators but identifies data needs and analytical methods for implementation in the 2011 household survey, community survey, focus group discussions (FGDs) and key informant interviews. In view of the limited resources available for data collection and analysis, and the constraints imposed by available data from previous evaluations and other data sources, we have looked for methods that are not too demanding of new or existing data or of sophisticated and time consuming analysis.

2 Benefit cost ratio

In the 2006/7 evaluation, the 2008/9 evaluation, and estimates of benefit costs ratios for other years, a standard methodology was used for estimating the economic benefit cost ratio and fiscal efficiency of the subsidy programme in terms of the value of the incremental production to beneficiaries (SOAS et al, 2008; Dorward and Chirwa, 2009; Dorward et al, 2010a; and Dorward and Chirwa 2010). It was recognised, however, that this method did not take account of wider benefits to consumers, particularly poor consumers, from lower food prices and that paradoxically a lower price of maize provided a lower estimate of programme benefit when programme impacts in lowering maize prices should lead to wider growth benefits, particularly for the poor.

The benefits of programme effects through potential lowering of maize prices and raising of wage rates for poorer households who are net maize buyers are illustrated in figure 1.

Figure 1 Tracing out direct and indirect subsidy impacts over time



Key: Positive effect
Negative effect

Source: SOAS et al (2008).

The left hand side of the figure shows three possible uses of the subsidy by recipients: reselling of coupons or of subsidized inputs, incremental use of the inputs in production, or use of the inputs with displacement of otherwise unsubsidised purchases. These lead to two main types of direct benefit for recipients: immediate income transfers from reselling or displacement, and incremental production at harvest if the inputs are used on farm.

- *Immediate transfer benefits* lead to tightening of the labour market in the season of implementation, with a contraction in labour supply by poorer households (who need to hire out less ganyu to earn food, as a result of income from reselling fertilizer) and a much smaller expansion of hired labour demand by less-poor households (who have more resources available to hire labour as a result of cash saved by subsidy displacement of unsubsidized seed and fertilizer purchases). This tightening of the labour market should lead to an increase in real wages. Increased wages should lead to immediate real income and hence welfare and consumption gains to poorer households, both recipients and non-recipients. Increased own farm labour use by the poor (as a result of reduced need to hire out labour) also means that gains from direct transfers to poor people and higher wages should lead to incremental production and welfare gains at and after harvest, even without any incremental input use (these gains will be offset to some extent in the wider economy by losses of low cost labour to the less poor, but the net effect is a progressive transfer and likely to lead to long term benefits to all groups). Less poor people who hire in labour may also incur a loss in net real income if they have to pay higher wages when hiring labour in and for purchasing local goods and services whose prices are determined largely by unskilled wage costs.

- *Incremental production* at harvest should increase households' stocks of grain. These increased stocks should reduce needs for pre-harvest grain purchases and this should decrease poorer households' hiring out of ganyu to earn cash and food,

leading to a rise in wages. At the same time increased sales and reduced purchases by subsidy beneficiaries should loosen the grain market, leading to a fall in maize prices. Poorer households should benefit from both higher wages and lower maize prices, while less-poor households may gain or lose from these changes, depending on the extent to which they hire labour in and out and buy and sell maize at different times. These processes at work in a year following a subsidy are strengthened by the further implementation of a subsidy in the second year, as this further eases seasonal cash constraints and tightens the labour market, as described above for year 1.

The effects of wage and maize price changes in these scenarios are to increase average real net incomes, with particular benefits to the poor (indeed they may in the short term appear to be damaging for less-poor households). These indirect impacts will affect all households in rural areas, not just programme beneficiaries.

SOAS et al (2008) and Dorward et al (2010a) report on indicative simulation of some of these processes for two major livelihoods zones in Malawi. This suggests that benefits differ between poor and less poor households and between those in different (poorer and less poor) areas, and that indirect benefits can be extremely important to poorer households.

Further subsidy impacts shown in figure 1 are that increased real incomes should lead to greater farm and non-farm investment (in human and social capital as well as in financial, natural and physical capital for particular enterprises), and that growing real incomes in rural areas should lead to increased demand for locally produced goods and services, including non staple foods. FGDs in 2007 commonly described many of these processes. However, high food prices in 2009 appeared to damp down and counteract FGD reports of the indirect benefits of the programme (for example maize price and wage impacts).

Further analysis of existing results from and further development of the simulation models reported above are one way of assessing the scale of indirect programme benefits. Another approach is introduce these issues into the benefit : cost analysis.

Drawing on Dorward (2009) we consider the effects of a large scale targeted subsidy on supply and demand of maize where the subsidy addresses market failures (in financial – credit - markets) by expanding production and hence total supply from poor beneficiaries, as shown in figure 2. Using this figure we can conceptually identify programme costs, direct incremental benefits to beneficiaries (from their incremental production and from expanded producer and consumer surpluses), and changes in consumer and producer benefits for existing production and consumption. Further elaboration of the model is needed to take account of rationing, integrated production and consumption in the household, and the dynamic effects of seasonal price changes and finance constraints on household behaviour (see Dorward: 2009, forthcoming).

There are difficulties in estimating some of the parameters needed for this work but it should be possible to define a range of likely estimates and hence a range of estimates of benefit cost ratios under different assumptions.

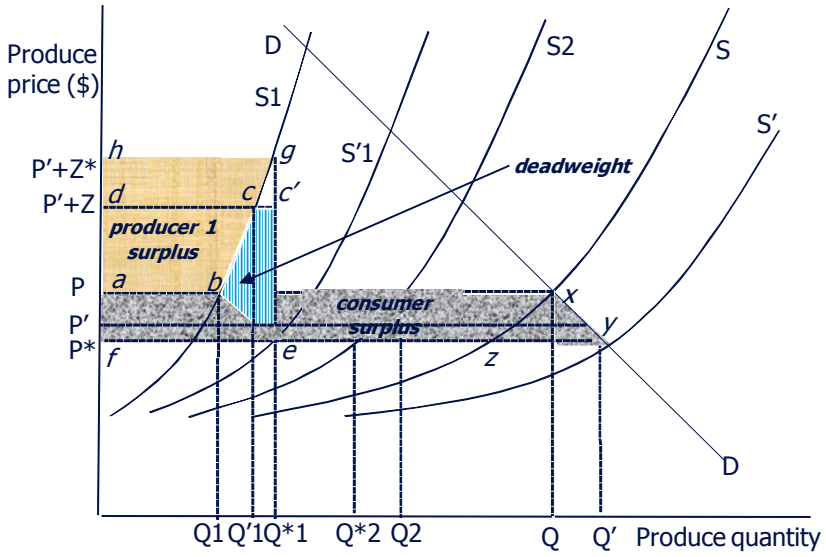


Figure 2 Analysis of targeted input subsidy impacts on output supply and stakeholder welfare with two household types

Notes: Q, Q1 and Q2: respectively total, household 1 and household 2 output quantities. Similarly for S (supply). P, P' and P*: respectively initial output price and price after subsidy with and without allowance for market failures. Z and Z*: respectively cost of subsidy per unit output subsidised and producer gain per unit subsidised (value of transfer and benefits from reduced market failure)

This analysis assumes that the programme causes a fall in the real price of maize. Following the 2006/7 season, however, there was a period in which real maize prices rose in Malawi. The relative importance of different reasons for this rise in real prices is not clear (for example the export of maize in 2007/8 is likely to be important but this does not account for continuing rises in 2008/9), but it is clear that apparent high real prices did not lead to suffering and welfare losses anything like as severe as those experienced in previous years with apparently similar high real prices. The absence of severe negative welfare impacts with high maize prices in 2008/9 appears to be due to a combination of higher wage rates and higher household maize stocks. Investigating these is important and it is intended to improve the collection and analysis of data on changes to wage rates, labour markets and stocks in order to examine potential impacts of the programme on poverty reduction from increases in real income (as described below): this may also be helpful in improving the benefit: cost analysis of the subsidy programme in situations where maize prices rose rather than fell[1].

3 Household income and poverty reduction

Poverty is a multi-dimensional condition which may be summarised as involving low levels of consumption (due to income, savings and asset constraints), together with economic and social marginalisation, powerlessness, and high vulnerability to a wide range of negative shocks and stresses. In this section we consider methods for estimating the impact of the subsidy programme on incomes and on asset holdings of different social groups (notably poor and less poor households, orphan headed households, and (poor) females and female

[1] In principle it might be argued that programme induced falls in maize prices can and should be separated from the effects of other policies, for example exports, that raise the domestic price of maize. These policies are, however, related, and hence it would be desirable, if possible, to estimate both their combined and separate effects. This may or may not possible.

headed households). We consider the questions of vulnerability and resilience in section 4, and of exclusion and disempowerment in section 5, though it is recognised that there are strong interactions between these different aspects of poverty.

Examination of changes in income as a result of the programme need to take account of both the direct and indirect effects of the programme on the different dimensions of poverty discussed above and experienced by different categories of poor people.

Direct effects of the programme can be measured using econometric analysis of panel data changes in critical variables. Constraints on such analysis are imposed mainly by the availability of relevant variables in existing panel data, that is in the IHS2, AISS1 and AISS2. It is proposed to examine here different combinations of subsidy receipt and non-receipt over time – distinguishing for example between those households who have received subsidised inputs a different number of times, and the patterns of those receipts. Ideally distinctions should also be made according to the combinations of inputs received (for example one or two bags of fertiliser, with or without hybrid seeds) in different livelihood zones. The complexity of this analysis will have to be controlled in order to make it manageable, but it is intended that this analysis will also shed light on graduation issues.

Key variables proposed here on which information exists and which may be relevant include crop areas and mixes, land rentals, unsubsidised input purchases, net sales/purchases of maize, grain storage, ganyu expenditure and income, wider income and its sources, asset ownership, and measures of food security and subjective well being. Poverty incidence will be estimated for 2011 using the Welfare Monitoring Survey model but taking account of seasonal bias in estimates (Chirwa et al, forthcoming). This will require collection of data on a small number of new variables not included in the AISS1 and AISS2. Some use will also be made of retrospective questions on some of these variables, to triangulate with other information – recognising the difficulties of bias that exist with such questions, and attempting to address them in the analysis. This approach will also be used to provide information on variables not included in previous survey rounds – for example school attendance.

Another important impact of the subsidy programme is how it has affected household's asset building and accumulation. As we note below, assets are important in household's resilience to different shocks. The IHS2, AISS1 and AISS2 all collected information on durable assets and livestock from which asset indices over time will be constructed in order to examine differences between different households. In the analysis of assets, it will be important to distinguish various types of assets, particularly the importance of productive assets. For example, increased investment by households in productive assets may offer greater opportunities for graduation and resilience to shocks and stresses.

Focus groups discussions and key informant interviews will be used to explore the same issues, to gain specific insights about perspectives of specific groups and their knowledge of the direct processes by which the programme has affected their lifestyles, positively and negatively. It will be important here to enquire about unexpected impacts, both positive and negative, that affect people's livelihoods, particularly those of vulnerable groups. Information from FGDs and key informants will play a critical role in examination of indirect impacts of the programme on incomes and livelihoods. Questions will seek to determine wider changes in people's livelihoods and how these are related to the direct impacts of the programme.

Use of survey data to examine differences between different types of household may also provide insights on the indirect effects of the subsidy programme. Here, for example, disproportionate benefits for some household types but not others, both with and without subsidy receipt, or between different areas, may be instructive. More general changes over

time will also be examined – for example using household and community survey data on wage rates, prices, and access to services. Secondary sources of information on changes in school enrolment and attendance, child nutrition, and poverty incidence will also be sought. Attribution of changes to the impact of the subsidy programme, and the independent and interrelated effects of other changes, will of course be difficult. Finally, the rural economy simulation models described earlier in section 2 will also be used to investigate some of the processes of indirect change resulting from the widespread impacts of the programme on households with different characteristics.

A difficulty faced with analysis of the data to be collected in 2011 is the change in survey timing from May / June (the timing of AISS1 and AISS2) to February/ March. Observations on variables like expenditure, income, food consumption and welfare perceptions are highly sensitive to seasonality in data collection (see for example Chirwa et al, forthcoming, which shows how poverty incidence estimates in the IHS2 are affected by the month of interview). Care will be taken to address this issue as far as possible in the design and conduct of the 2010 survey and in analysis across the different years – this is of course also an issue with the IHS2 data.

4 Vulnerability and resilience

Vulnerability and resilience are closely related concepts. Vulnerability is best considered as the susceptibility of people to the effects of negative shocks and stresses, and is determined by their exposure and sensitivity to such shocks and stresses, where sensitivity describes the extent to which a shock or stress negatively affects people's livelihoods and welfare. Resilience is best considered as the opposite of sensitivity, describing the ability to cope with shocks and stresses either by absorbing their effects or by responding to them in ways that allow rapid adaptation and recovery to restored or new livelihoods. These definitions of vulnerability and resilience are important as they allow us to identify the following key issues in examining vulnerability and resilience: exposure to shocks and stresses; short term impacts of shocks and stresses and ability to cope with them; and long term impacts and ability to recover from them.

The IHS2, AISS1 and AISS2 all collected information on shocks and stresses affecting respondents in terms of perceived occurrence, impacts, and responses. Analysis of changes over time in this information will be an important component of consideration of vulnerability and resilience impacts of the programme, with consideration of both direct and indirect programme impacts. Household survey information will be backed up by FGDs gathering information on these topics.

Vulnerability and resilience are also affected by people's income and asset levels, by diversification in income and asset portfolios, and by interactions of these with exposure and susceptibility to different shocks and stresses. Investigation of income and asset levels and of diversification was discussed earlier in section 3 under consideration of programme impacts on income and poverty, and this analysis will be extended where necessary and possible to address issues of vulnerability and resilience.

It will be important in the investigation of vulnerability and resilience to consider exposure and sensitivity not only of household livelihoods but also of the wider economy.

5 Exclusion and disempowerment

Exclusion and disempowerment are key elements in the experience of poverty as well as in its perpetuation for disadvantaged and marginalised groups. Women, people living with

chronic illnesses and disability (particularly HIV/AIDS) and orphans are critical groups affected by these processes, as are the chronically poor.

Where possible the survey data will be used to investigate programme impacts on these groups. Considerable information already exists on gender issues in the IHS2, AISS1, and AISS2. This will be augmented by continued collection of the same data in the 2011 household survey together with further analysis of female headed household and intra-household participation in the programme and its impacts. This will build on previous analysis of female headed access to coupons and subsidised fertiliser (SOAS et al, 2008; Dorward et al, 2010b) and of female control of subsidised fertilisers within male headed households (Chirwa et al, 2010a). There is, similarly, considerable existing information on particularly poor groups in the existing surveys, and scope for further analysis of their participation in the programme and access to its direct and indirect benefits (Chirwa et al, 2010b). There is less information in previous surveys on people living with chronic illnesses and disability (particularly HIV/AIDS) and on orphans although some specific information about the chronic illnesses (as well as acute illnesses, births and deaths) has been collected under information on shocks and stresses. There is, however, no specific information on orphan headed households, and sample size of households affected by chronic illnesses and containing orphans are relatively small. The first of these issues will be addressed by purposively sampling orphan headed households and households with younger heads when replacing missing panel households in the 2011 household survey. Sample sizes for these households will nevertheless continue to be small, and there will be no panel data analysis for these households, for whom retrospective questions will therefore be important. The previous study on intra-household use of fertilizers (Chirwa et al, 2010a) observed fungibility between use of commercial and subsidised fertilizers at plot level in households that had access to both subsidized and unsubsidized fertilizers. To better identify intra-household impacts of receipt of subsidised fertilisers, an attempt will be made in the next round of the survey to get more information about the use of subsidized fertilizers at plot level, although in some cases it will be difficult to isolate specific fertiliser use by origin where their use has been mixed.

Focus group discussions will be critical for gathering information on vulnerable and excluded groups and on their experience in accessing subsidised inputs. Issues here include how their status affects processes for obtaining coupons, uses of coupons received, costs of redemption, and benefits from different uses. Again both direct and indirect impacts need to be considered, with enquiry about possible unexpected impacts, both positive and negative, that emerge from social interaction and promote or undermine the inclusion and empowerment of vulnerable groups.

6 Conclusions

This paper has identified the need for extensions in the analysis of data collected in household and community surveys and focus group discussions in previous studies in order to address more fully questions about programme impacts on the wider economy and on specific poor and vulnerable groups. These issues are considered separately with specific proposals to conduct new analysis and some new data on each of these issues. Due consideration will be given to both direct impacts on programme beneficiaries and indirect impacts on the wider economy and on non-beneficiaries

There are substantial synergies in the analysis of the issues considered, as they interact and overlap with each other. Thus, for example, information on asset and income levels and portfolios is relevant to consideration of the programme's direct and indirect impacts on growth, poverty, resilience and exclusion. As regards direct impacts, the same data and analysis may be relevant to examination of different issues. Indirect impacts may also lead to

cross-over impacts across different issues (for example resilience is likely to be strongly affected by growth).

A variety of existing and new data sources will be used for the analysis of these issues. Existing information in previous surveys will be critical for analysis of panel data and the attribution of direct impacts. Although this analysis will be limited by the range of variables included in data collection in previous survey rounds, questionnaires in these rounds did include variables that are relevant to many of the issues addressed in this paper: new analysis of data from previous rounds and continuation with these variables in the next survey round should therefore provide significant information on the direct impacts considered in the paper. A topic on which existing data are limited is information on orphan headed households, and the change in timing of the 2011 survey will also pose challenges in the collection and analysis of data on food security. These issues will be addressed in questionnaire design.

Panel data cannot provide straight forward information on indirect impacts of the programme. Here use will be made of a range of information sources (household and community survey data, focus group discussions, and secondary information from other sources) to examine wider changes, and then attribution of these changes will be investigated with triangulation of information across focus group discussions, key informants, econometric analysis, livelihood and rural economy simulation models, secondary sources and theoretical considerations.

Acronyms

AISS1	Agricultural Input Subsidy Survey 1 (2006/7)
AISS2	Agricultural Input Subsidy Survey 2 (2008/9)
FGD	Focus Group Discussions
FISP	Farm Input Subsidy Programme
IHS2	Integrated Household Survey 2 (2003/4)

References

Chirwa, E., P. Mvula, A. Dorward and M. Matita (2010a) *Gender and Intra-Household Use of Commercial and Subsidized Fertilizers in the Malawi Farm Input Subsidy Programme*

Chirwa, E., M. Matita and A. Dorward (2010b) *Targeting Agricultural Input Subsidy Coupons in Malawi*

Chirwa, E., A. Dorward and M. Vigneri (forthcoming). Seasonality and Poverty: The 2004/05 Malawi Integrated Household Survey. In R. Sabates-Wheeler and S. Devereux *(eds) Seasonality, Rural Livelihoods and Development*., Earthscan.

Dorward, A. R. (2009). Rethinking agricultural input subsidy programmes in developing countries. *Non-distorting farm support to enhance global food production*. A. Elbehri and A. Sarris. Rome, Food and Agriculture Organisation of the United Nations**:** 311-374.

Dorward A (forthcoming) Seasonality and capital in farm household models. In R. Sabates-Wheeler and S. Devereux *(eds) Seasonality, Rural Livelihoods and Development*., Earthscan.

Dorward, A. and E. Chirwa (2010a). *Evaluation of the 2008/9 agricultural input subsidy Malawi: Maize production and market impacts* London, School of Oriental African Studies (SOAS).

Dorward and Chirwa (2010b) *The Farm Input Subsidy Programme (FISP) 2009/10: A review of its implementation and impact.* Draft November 2010

Dorward, A. R., E. Chirwa and R. Slater (2010a). Evaluation of the 2008/9 agricultural input subsidy Malawi: Preliminary Report on Programme Impact London, School of Oriental African Studies (SOAS).

Dorward, A. R., E. Chirwa and R. Slater (2010b). Evaluation of the 2008/9 agricultural input subsidy Malawi: Report on Programme Implementation. Draft. London, School of Oriental African Studies (SOAS).

Dorward, A. R. and E. Chirwa (2009). *The Agricultural Input Subsidy Programme 2005 to 2008: Achievements and Challenges.* London, School of Oriental and African Studies.

Dorward A.R and E. Chirwa (2010) *The Farm Input Subsidy Programme (FISP) 2009/10: A review of its implementation and impact.* London, School of Oriental and African Studies (SOAS). Draft November 2010

School of Oriental and African Studies (SOAS), Wadonda Consult, Michigan State University and Overseas Development Institute (2008) *Evaluation of the 2006/7 Agricultural Input Supply Program, Malawi*. Final Report prepared for Malawi Government and DFID (Malawi).