

EVALUATION OF THE 2008/9 AGRICULTURAL INPUT SUBSIDY PROGRAMME, MALAWI

Report on Programme Impact

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1. Introduction

This paper, part of a set describing different aspects of the 2008/9 agricultural input subsidy, provides some initial findings on the impact of the subsidy programme. It draws on separate reports of implementation, on the input supply sector, and on maize production and markets, and presents information on impact from the focus group discussions and the household survey. Information on the impact of the programme on total production is used to estimate the economic return to the programme.

The objectives of the programme are variously stated to be to improve national and household food security and self sufficiency and incomes through increased food and cash crop production and productivity as a result of improved accessibility and affordability of agricultural inputs among the most vulnerable farmers (for example MoAFS 2008a, 2008b). Further objectives emphasised by some are the promotion of economic growth and the development of the private sector agro dealer (input) network. These objectives are consistent with the National Agricultural Policy Framework (2006) overall objectives and purposes, and with results and strategies concerned with sustainable management and use of natural resources (2), increased smallholder productivity of food and cash crops (8), and promotion of agribusinesses (11). They are also consistent with the Agricultural Development Programme (ADP) priorities on improved food security at household and national level; commercial agriculture, agro-processing and market development; and sustainable agricultural land and water management. Potential synergies with other ADP priorities (climate change and key support services - institutional development and capacity building and agricultural research and extension services) are not so explicit.

These objectives can be considered against the potential positive impacts of a large scale agricultural inputs subsidy programme as set out in figure 1. At the heart of figure 1 is the implementation of the input subsidy programme (1). The scale of this and the way that it is done impact directly on coupon recipients (2a), on the input supply system (3) which is composed of private sector importers and suppliers, ADMARC and SFFRFM, and on the macro-economy and its management (4). The livelihoods, activities and welfare of coupon recipients then affects relationships within rural communities and local and wider ganyu markets and maize markets (5) and this impacts upon non-recipients (2b). All of these components interact with each other and with wider factors in the environment, shown on the right hand side of the diagram, to determine shorter term and dynamic growth and welfare impacts. Another set of interactions are likely to arise between impacts of the input subsidy on the one hand and impacts of other (formal and informal) social protection measures.

We use this framework to structure this report, considering in turn (a) implementation, (b) effects on the input supply system, (c) on the macro-economy, and (d) on rural people, both recipients and non-recipients. We also consider the estimated economic returns to the programme. In considering implementation and effects on the input supply system we refer to the separate reports on these topics.

No information has been available on disbursement or costs of grain storage or cotton chemicals and they are barely considered in this report.

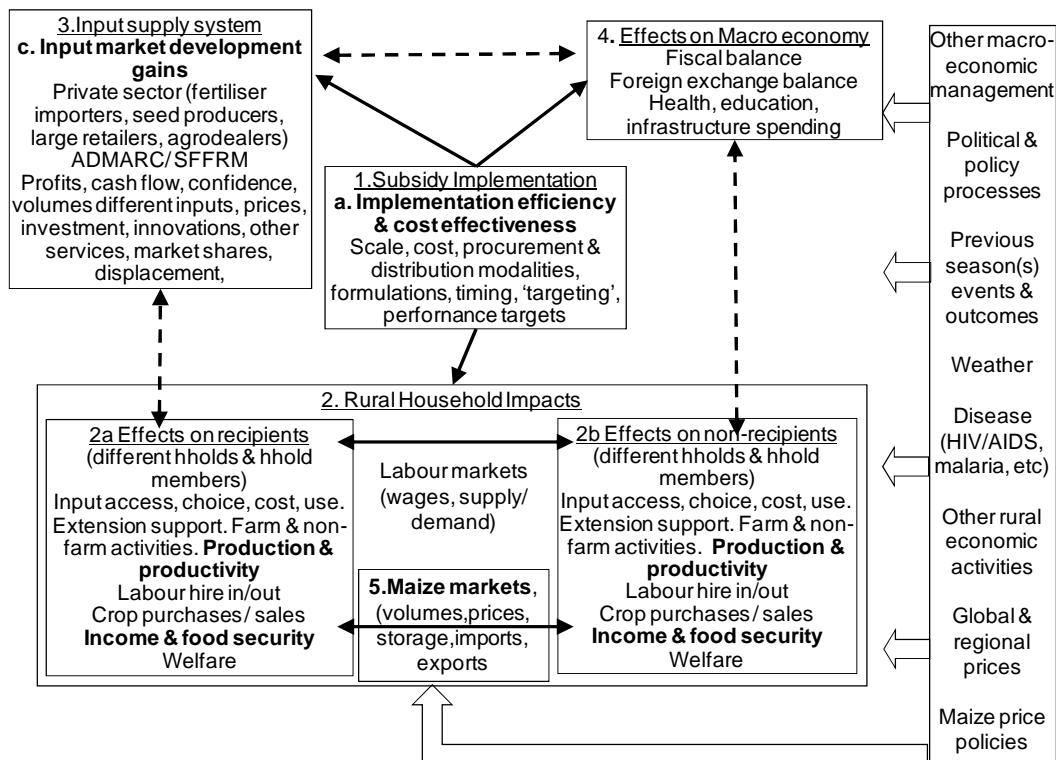


Figure 1. Potential impacts of a large scale agricultural inputs subsidy programme

2. Implementation¹

Implementation is a key driver of subsidy programme impacts, which are affected by both what is implemented and how it is implemented.

The AISP is a very large programme. In 2008/9 it involved selection of over 1.5 million fertiliser coupon beneficiaries from over 2.5 million farm households, printing and distribution of 6.2 million coupons, and purchase and distribution of over 4.3 million bags of fertiliser (of which 4.0 million were sold) with sales of just under 2.6 million packs of seed.

Particular points to note about implementation that are relevant to impact are the following:

- Subsidized fertiliser sales were exclusively through ADMARC and SFFRFM in 2008/9, with a late decision to exclude the private sector from these sales. These amounted to between 198,000 and 202,000 MT of fertiliser. There was some improvement in timeliness of fertiliser sales over the previous year.
- Lack of legume seeds was a major constraint to the subsidized sees programme contributing to more diverse cropping. Subsidized maize seeds amounted to 4,500 MT of hybrid seed and 800 MT of OPV seed.
- Difficulties with coupon security were encountered with the initial printing, requiring a second printing of more secure coupons, which appears to have been successful. Improved security features were not accompanied by the introduction of bar coding, which could be used for improving both security and tracking of coupons.

¹ This section draws heavily on Dorward, Chirwa and Slater (2010)

- Since 2005/6 there has been a continued increase in the share of coupons allocated to the Southern region, but coupons received per household are still higher in the North.
- The issue of a second round of 'supplementary' vouchers lacks transparency and is difficult to track.
- The introduction of open meetings for allocation and distribution of initial fertiliser and seed coupons and greater involvement of MoAFS staff in coupon distribution are widely reported and commended as improving coupon allocation and distribution. There are, however, still difficulties with lack of transparency and accountability regarding both the total allocation of coupons to areas/communities and their allocation *within* areas/communities.
- Estimation of the diversion of coupons and subsidised inputs from intended smallholder beneficiaries to others is rendered difficult by the inherent difficulties in gathering information on such topics and also by the lack of agreement between the NSO and MoAFS on the number of farm families in the country.
- Focus group discussions and survey data show, as in 2006/7, that though the poor are not excluded from receiving coupons, the poorest households are less likely to receive coupons.
- Although the vast majority of recipients among survey respondents report that they use their coupons to buy inputs and use the inputs on their own crops, FGDs and stakeholders consider sales of coupons and of subsidised inputs to be more prevalent, particularly the latter. Analysis of reported household purchases suggests that smallholder purchases of resold subsidy fertilisers are between 10% and 20% of total smallholder subsidised input purchases.
- Many coupon recipients faced stock-outs, queues and demands for extra payments or 'tips' when redeeming coupons, particularly for fertilisers. There is some evidence that distances to stockists, time spent redeeming inputs, and payment of 'tips' all increased in 2008/9 as compared with 2006/7.
- Whereas 80% or so of male coupon recipients and less poor coupon recipients rely on savings to finance coupon redemption, 66% of female and 60% of poor recipients can rely on savings, with ganyu, safety net programmes and gifts all being more important for poorer recipients. Focus group discussions emphasise the challenges that poor households face in finding the money to redeem coupons, and the way that these problems are exacerbated by demands for redemption 'tips', particularly when there are queues at markets.
- A relatively low proportion of households and recipients (14% and 18% respectively, higher in the north) report that they receive advice from field assistants on fertilisers and new varieties.
- Costs of the programme have increased dramatically due largely to high prices for fertilisers in 2008/9 and to increases in subsidised fertiliser volumes from 2005/6 to 2007/8, and hence in 2008/9 were almost double budgeted costs. Total recorded cost of the programme amounted to just under MK39.85 billion (US\$284.6 million) before recovery of farmer repayments. Equivalent figures after recovery of farmer repayments should be MK33.8 billion and US\$ 241.7 million. This excludes a number of major costs (including MoAFS and ADMARC operational costs) which are estimated at approximately MK1.41 billion or US\$ 10.1 million.

3. Input supply system²

The AISP is a major intervention in input markets – affecting fertiliser and seed importers, seed producers, and input wholesalers, retailers, and agro-dealers. It is also a major logistical activity involving very significant resources in the purchasing and transport of inputs and in the distribution and redemption of vouchers, with potential to crowd out other agricultural services. Developing an effective input supply system is important for two first reasons. First, an effective input supply system is an essential component of effective implementation of the AISP in terms of distribution and sale of inputs. Second, although the primary objective of AISP is to improve food security, a secondary objective is to build a reliable input

² This section draws heavily on Kelly, Boughton and Lenski (2010)

distribution system with an appropriate mix of government and private sector services. Progress made toward the secondary objective differs for the seed and fertilizer subsectors:

- Important progress has been made in the seed subsector as a result of the AISP. More than 5,000 tons of subsidized seed was distributed through a range of retail outlets and the share of hybrids in this rose to 84%.
- The private sector estimates that effective demand for formal sector maize seed is double pre-AISP levels and that both the seed subsidy and the fertiliser subsidy are promoting demand for unsubsidised hybrid seeds as well as a network of dealers selling these seeds, and improved relations between seed suppliers and agro-dealers, with increased support from seed supplies to agro-dealers.
- The seed association, STAM, has played an effective role in increasing the professional capacity of its members and dialoguing with government.
- Important progress has also been made in the fertilizer subsector with improvements in tendering procedures and increased private sector involvement in importation. The private sector has also expanded its participation in subsidized fertilizer sales, expanded its distribution networks and is developing innovative partnerships with independent agro-dealers. The private sector also responded to the financial incentive provided by government to expand geographic coverage to include remote locations.
- However the progress made toward harnessing the capacity of the private sector for fertilizer distribution since 2005/6 was unwound by the unexpected decision of GOM in October 2008 to rescind the private sector's authorization to distribute fertilizer in return for vouchers. This decision undermined hard-won confidence in transparent dialog between the public and private sectors, and its timing was financially very damaging to the private sector as contracts had already been awarded, fertilizer imported and paid for, and other investments made in distribution and sales. Private sector sales of subsidized seed were also undermined because farmers want to procure the two types of input at the same location at the same time. Ironically, the private sector companies who were most negatively affected by the Government's decisions were the ones who had done most to respond to the government's desire for expanded access in rural areas.
- A number of consequences follow from the lack of involvement of private sector companies in retailing subsidised fertiliser, apart from direct damage to affected companies and the loss of government credibility with the private sector:
 - The dismantling of private rural fertilizer and related outlets to pre-2007/8 levels.
 - It is also widely reported that farmers faced increased demand for illegal "tips" at government outlets because of the lack of alternative sources for subsidized fertilizer, longer waits when stock outs occurred, and lack of choice in seed varieties when government depots only distributed one variety at a time for reasons of administrative convenience. If this is the case it will have been particularly damaging for poorer beneficiaries, for whom such tips are more difficult to afford.
 - Farmers also faced diminished access to agricultural inputs for the dimba season as most government outlets in rural areas only operate on a seasonal basis.
 - In the long run it may affect the general extension of access of rural people to retail shops for a wide range of goods, as many of the affected retailers stock a variety of goods in addition to fertilisers.

4. Production impacts³

The core of the AISP is the transfer to selected rural households of a voucher which will benefit them either by enabling them to increase their use of fertiliser, seed or pesticides (the intended benefit) or by effectively giving them a cash transfer as they either sell the voucher or they use it to finance the purchase

³ This section draws heavily on Dorward and Chirwa (2010)

of inputs that they would have purchased anyway (an unintended benefit). If the voucher leads to increased (incremental) input use it should lead to an increase in agricultural land and labour productivity and to extra production of the crop to which it is applied. In this section we report on estimates of incremental production arising from the AISP.

Critical components of estimating incremental production from the AISP are an understanding of (a) yield increments obtained from the use of fertiliser and hybrid and OPV seed on maize, (b) determinants of yield response that are amenable to improvement, and (c) the amount of incremental fertiliser and seed use resulting from the programme. The evaluation of the 2006/7 programme was not able to estimate yield effects from fertiliser and seed, due to inadequacies in the quality of the yield data from the household survey. In the evaluation of 2008/9 programme this difficulty was addressed in two ways, (a) by improving the management of the survey and continuing to use the previous method of estimating yield from farmers' reported harvests, and (b) by trialling a different approach to yield estimation by recording harvested amounts from a small demarcated sub plot positioned randomly in one maize field of a sub sample of farmers. In addition analysis of maize production, consumption and market flows also provides important information on production.

Examination of historical changes in maize prices and per capita net supply from 1993/4 suggests some consistency in maize supply estimates up to the 2006/7 market season and significant elasticity of demand within Malawi. It also suggests likely maximum per capita supply of around 200kg in good years with the subsidy and inter-seasonal grain storage, and hence upper limits on smallholder maize production of 2.7 to 3.5 million MT depending upon the number of households in Malawi. Estimates of yields that achieve this depend upon estimates of cultivated maize area per household.

Two different survey approaches were taken in estimating maize production, yield and yield responses to fertiliser: using farmer reported whole plot harvests, and harvesting of production from yield sub plots. Each faces different problems of bias, but both face estimation difficulties in regression model specification and multicollinearity, and estimates of production, yield and yield response are also affected by the reliability of farmer estimates of plot area, which may be upwardly biased.

There are therefore critical data difficulties that impede estimation of precise yield and production benefits from the programme. Given the importance of smallholder production in the economy and for food security and welfare, it is very important that critical investments are made to improve national statistics on yields and crop areas, and to resolve differences between NSO and MoAFS estimates of the number of farm families. Nevertheless, the analysis of estimated maize yields and yield responses in 2008/9 demonstrate the importance of good crop husbandry (timely and complementary seed and fertiliser delivery and use coupled with good weeding) for improving programme implementation, and this suggests that there may be substantial returns to investment in extension services to complement investments in fertiliser and seed subsidies.

Using similar yield response rates to those used in the 2006/7 analysis, the incremental production from the 2008/9 subsidy programme is estimated at around 1 million MT. This is considerably greater than the 650,000MT estimated for 2006/7 due to the larger volume of inputs disbursed and lower displacement of smallholder purchases of unsubsidised fertilisers in 2008/9

5. Macro-economic effects

The macroeconomic economic environment has remained stable in spite of the unexpected high expenditure on the agricultural subsidy programme resulting mainly from the substantial rise in the prices of fertilizers. The unexpected increase in the subsidy programme expenditure was expected to increase government deficit spending in the 2008/09 fiscal year, thereby leading to domestic price instability. Due to the subsidy, the MoAFS has the largest share in the budget, accounting for as much as 14 percent in the 2008/09 budget. With the upward revision of the provision of the subsidy due to increased fertilizer prices, actual expenditures are likely to be more than 14 percent of government expenditures. The subsidy alone

constitutes more than 60 percent of the MoAFS budget. We assess the macroeconomic effects using the trends in GDP growth rates, government spending and price level. Table 1 and Figure 2 presents the trends in macroeconomic indicators since 2005. The economy has witnessed consistent positive growth in terms of real GDP growth rates from 3.3 percent in 2005 to 9.7 percent in 2008. GDP was projected to grow by 6.9 percent in 2009, the drop mainly attributed to the impact of the global economic crisis. Estimates of GDP growth have been significantly impacted by the significant increases in estimated maize production since the implementation of the subsidy. Estimates by Dorward and Chirwa (2010) of incremental production due to the subsidy programme are lower, but are nevertheless very large, and suggest that incremental maize production due to the programme has had a significant positive impact on GDP growth.

Table 1 Trends in Macroeconomic Performance Indicators, 2005 – 2009 (%)

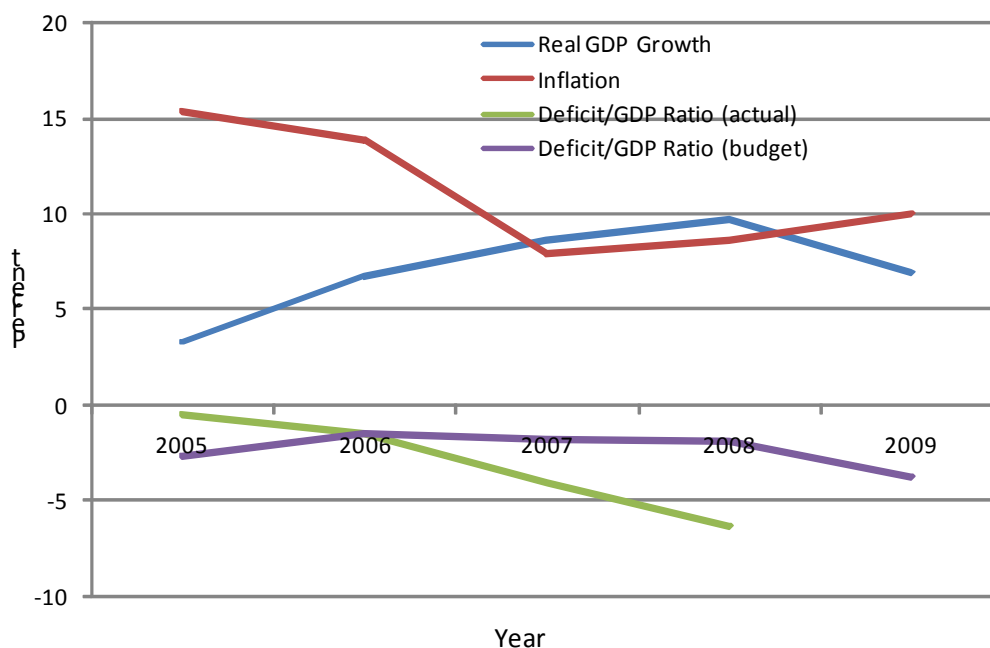
Indicator	2005	2006	2007	2008	2009
Real GDP Growth	3.3	6.7	8.6	9.7	6.9
Inflation	15.4	13.9	8.0	8.7	10.1
Deficit/GDP Ratio (actual)	0.4	1.4	4.0	6.3	
Deficit/GDP Ratio (budget)	2.6	1.5	1.8	1.9	3.7

Source: Reserve Bank of Malawi, *Financial and Economic Review 2009*

The economy has also experienced some price stability and reduction in inflation from 15.4 percent in 2005 to 8.7 percent in 2008, but inflation is projected to increase to 10.1 percent in 2009 (largely due to higher maize and fuel prices). Again the incremental maize production from the subsidy programme should have exerted a downward influence on maize prices.

With respect to government spending behaviour, we report the actual and the budget ratio of the fiscal deficit to GDP. Both ratios show worsening of the budget deficit, particularly the actual ratio of deficit to GDP. The actual deficit/GDP ratio was less than 1 percent in 2005 but this increased to 6.3 percent in 2008. Similarly, the budget deficit/GDP ratio increased from 1.5 percent in 2006 to 3.7 percent in 2009. The increase from 1.9 percent in the 2008 budget to 3.7 percent in 2009 reflects the impact of increased expenditure partly due to high fertilizer prices. It is anticipated that, due to increased revised allocation to the subsidy programme the actual deficit/GDP ratio will be much higher than 3.7 percent.

Figure 2. Macroeconomic Performance Indicators, 2005 - 2009



There is anticipation that the increased expenditure in the 2008/09 season, partly due to the increased cost of the subsidy, will have marginal effects on the price level, with a possibility of double digit inflation. Apart from good financial management, one factor that has helped in price stability in the country is the management of the exchange rate which has remained fixed and stable against the US dollar. This has limited cost-push inflation that might have come from imports given that imports have also significantly risen in the past five years. It is evident that the good macroeconomic management has limited the detrimental effects that increased expenditures on the subsidy might have had on the economy. However, given the extent of the cost over-run for the 2008/09 subsidy programme, the actual effects on deficit spending and the price level may turn out to be significant. There is anecdotal evidence that the increased import cost for fertilizers has led to foreign exchange scarcity in the 2009/10 fiscal year.

6. Rural welfare Impacts

We report here analysis of household survey data on changes in food security and welfare as reported by survey respondents. In the following section we report on estimates of incremental production from the programme.

6.1 Food security

Table 2 compares households' own assessment of their food security situation in the month immediately prior to interview the survey by livelihood zone in 2006/07 and 2008/09.

Table 2 Household Food Consumption over Past 1 Month, 2006/07 - 2008/09

Livelihood Zone	Sample (hh)	Proportion of households in 2006/07 (%)			Proportion of households in 2008/09 (%)		
		Less than adequate	Just adequate	More than adequate	Less than adequate	Just adequate	More than adequate
Kasungu Lilongwe Plain	399	38	48	14	9	57	34
Shire Highlands	204	37	58	6	5	77	18
Lake Chilwa Phalombe Plain	180	45	45	10	13	63	24
Lower Shire	140	54	35	10	35	44	21
Northern Lakeshore	120	40	44	16	32	40	29
Rift Valley Escapement	120	27	59	13	1	81	18
Thyolo-Mulanje Tea Estates	120	20	69	10	4	56	41
Chitipa Maize & Millet	100	44	55	2	14	36	50
Mzimba Self-Sufficient	100	52	43	5	18	46	37
Middle Shire	99	37	51	12	4	78	18
Border Productive Highlands	80	39	53	8	2	63	36
Pirilongwe Hills	80	26	70	4	6	84	10
Southern Lakeshore	60	40	45	15	12	84	3
Central Karonga	40	58	35	8	20	66	14
Nkhata Bay Cassava	40	35	59	6	2	61	37
Northern Karonga	40	61	33	6	5	66	29
Western Rumphi & Mzimba	40	35	60	5	15	40	45
Misuku Hills	20	43	57	0	15	50	35
All	1982	38	51	10	10	63	27

Notes: Zones arranged in approximate order of decreasing sample size

For most of the households in the survey the past one month of the interview was May and June, just two months after the 2006/7 and 2008/9 harvests. Overall, only 10 percent of households had less than adequate food consumption over the past month of the survey in 2008/09 compared to 38 percent in 2006/07. In terms of livelihood zones, it is apparent that the proportion of households reporting less than adequate food consumption over the past month of the survey has declined in all zones between 2006/07 and 2007/08. This suggests that there was an improvement in food consumption immediately following the 2008/09 harvest compared with the 2006/07 harvest. The largest percentage point decline occurred in Northern Karonga (56%) followed by Border productive Highlands (37%). There are variations across the livelihood zones in 2008/09, but the Lower Shire and Northern Lakeshore zones had the worst food consumption status just following the 2008/09 harvest. These zones are also cotton growing zones and it is likely that the problems in the marketing of cotton due to the high minimum price set by the government adversely affected their purchasing power and food consumption. The Lower Shire was also reported to have had maize failure.

Table 3 shows the proportion of households by food consumption status over the past 12 months of the survey prior to May/ June 2007 and 2009, and thus determined more by the previous year harvest (2005/6 and 2007/8 respectively). In contrast to the consumption over the past 1 month, there is a marginal increase in the proportion of households that had less than adequate food consumption over the past 12 months from 50 percent in 2006/07 to 56 percent in 2008/09. There is no change in the proportion of households reporting more than adequate food consumption over the past 12 months. This is consistent with high maize prices affecting food deficit households in 2008/9 (after the 2007/8 harvest) compared with low prices in 2006/7 (after the 2005/6 harvest). However information from the Focus Group Discussions suggests that people do have more food and had reduced theft of food in some areas.

Table 3 Household Food Consumption over Past 12 Months, 2006/07 - 2008/09

Livelihood Zone	Sample hh	Proportion of households in 2006/07 (%)			Proportion of households in 2008/09 (%)		
		Less than adequate	Just adequate	More than adequate	Less than adequate	Just adequate	More than adequate
Kasungu Lilongwe Plain	399	51	36	12	62	33	6
Shire Highlands	204	47	50	3	52	38	10
Lake Chilwa Phalombe Plain	180	52	43	5	69	24	7
Lower Shire	140	60	30	9	56	34	11
Northern Lakeshore	120	51	45	4	44	39	16
Rift Valley Escapement	120	39	47	14	57	37	6
Thyolo-Mulanje Tea Estates	120	59	39	2	28	53	20
Chitipa Maize & Millet	100	41	51	9	27	58	15
Mzimba Self-Sufficient	100	44	50	6	41	52	6
Middle Shire	99	50	44	6	63	35	2
Border Productive Highlands	80	47	43	10	51	44	5
Pirilongwe Hills	80	45	53	2	71	27	2
Southern Lakeshore	60	48	40	13	65	33	2
Central Karonga	40	54	46	0	59	33	8
Nkhata Bay Cassava	40	43	49	8	36	56	8
Northern Karonga	40	44	39	17	36	44	20
Western Rumphu & Mzimba	40	54	46	1	43	47	10
Misuku Hills	20	7	86	7	40	40	20
All	1982	50	42	8	56	36	8

Notes: Zones arranged in approximate order of decreasing sample size

6.2 Subjective assessment of poverty and welfare

Table 4 shows poverty rankings and changes in poverty by livelihood zone based on the subjective assessment of households on their poverty status in different years. Poverty was assessed qualitatively using a ladder with step 1 representing the very poor (poor of poorest) and step 6 representing the rich. Overall, the trend in rankings reveals that households' perceived well-being has improved from an average of 1.94 in 2004/05 to 2.35 in 2008/09. Comparing June 2007 and May/June 2009, it is apparent that in all livelihood zones except Central Karonga households experienced positive changes in welfare. More dramatic is the change in the headcount of the very poor between June 2007 and June 2009. Overall, the proportion of the very poor declined by 23.2 percent between 2007 and 2009, and all livelihoods zones with the exception of Central Karonga were not worse off based on this indicator. Western Rumphu and Mzimba zones experienced the highest reduction of 64 percent in the number of households describing themselves as very poor. Most of these have moved to the group of marginally poor (21.6 percent increase) and marginally above poverty (25.1 percent increase), although 11.5 percent of those who were above poverty in 2007 have become worse off.

Table 4 Subjective Assessment of Poverty 2004/05 to 2008/09

Livelihood Zone	sample (hh)	Mean Ranking of Own Poverty Assessment			Change in mean ranking 2007 – 2009 (%)	Change in proportion of the <u>very poor</u> 2007 – 2009 (%)
		2004 (adjusted)	June 2007	June 2009		
Kasungu Lilongwe Plain	399	1.90	2.08	2.1	1.1	-13.3
Shire Highlands	204	2.25	2.44	2.69	10.2	-37.1
Lake Chilwa Phalombe Plain	180	2.08	2.13	2.25	5.5	-10.7
Lower Shire	140	2.10	2.03	2.24	10.3	-24.7
Northern Lakeshore	120	2.01	2.06	2.35	14	-44.3
Rift Valley Escapement	120	1.87	2.04	2.21	7.9	-21.9
Thyolo-Mulanje Tea Estates	120	1.95	2.19	2.42	10.4	-38.5
Chitipa Maize & Millet	100	1.94	2.43	2.83	16.5	-53.3
Middle Shire	99	2.11	2.26	2.42	7.3	-34.2
Mzimba Self-Sufficient	100	1.96	2.12	2.46	16.4	-42.3
Border Productive Highlands	80	2.06	2.2	2.37	7.7	-30.8
Pirilongwe Hills	80	2.30	2.43	2.62	8.1	-30.8
Southern Lakeshore	60	2.53	2.56	2.75	7.4	-31.4
Central Karonga	40	1.53	2.16	2.08	-3.6	51.3
Nkhata Bay Cassava	40	1.99	2.37	2.76	16.2	-5.6
Northern Karonga	40	2.42	2.67	2.77	3.5	-11.9
Western Rumphu & Mzimba	40	1.80	2.13	2.51	18.3	-63.9
Misuku Hills	20	2.27	2.8	3.1	10.7	0
All	1982	2.02	2.19	2.35	7.1	-23.2

Notes: 2004 score assessed in 2007 adjusted by % change in 2007 scoring from the 2007 to the 2009 assessment

Zones arranged in approximate order of decreasing sample size

The ordinal scale for subjective welfare evaluation ranges from 1 (very poor) to 6 (very rich).

Information from the Focus Group Discussions on well being ranking did not reveal such a clearly discernible trend. In many districts, it was suggested that the number of female-headed households was growing and most of them were in the lower categories of the wealth and well-being ranking.

6.3 Subjective assessment of shocks

Households were also asked to rate their 'overall satisfaction with life' in the AISS 2009. There are no significant changes between 2007 and 2009. The results from the household survey revealed that 25.3 percent of households were satisfied or very satisfied with life, a slight improvement from 25 percent reported in AISS 2007. The proportion of very unsatisfied households fell from 33 percent in 2007 to 31.2 percent in 2009 while that of unsatisfied households increased from 33 percent to 36.2 percent.

Table 5 presents the proportion of households who experienced shocks and stresses by the in the past two years prior to the AISS in May/June 2007 and May/June 2009. There is a general increase in the proportion of households experiencing shocks in AISS 2009 compared with the situation in AISS 2007. It is, however, worth noting that the five most experienced shocks in 2009 were also the shocks that affected most households in AISS 2007 although their relative ranking has changed. In AISS 2007, the typical shock was low crop yields due to poor soil fertility, affecting 33.3 percent of rural households. This is the second ranked shock in AISS 2009, affecting 44.6 percent of households. In AISS 2009, a large rise in the prices of food is the main shock affecting 50.5 percent of rural households. This is not surprising given the increases in maize food prices in 2008/9 in Malawi. The proportion of households affected by the reduction in ganyu opportunities or wage rates has remained stable and has increased by 1 percentage point. There are marginal reductions in the proportion of households experiencing birth in the household, break-up of household and loss of salaried employment. Information from the Focus Group Discussions on suggest that the main drivers of deteriorating well-being are changes in household composition – due to death (often from AIDS), desertion or divorce.

Table 5 Proportion of rural household severely affected by different shocks and stresses (%)

Shocks and stresses	AISS May/June 2007 (2005 – 2007)	AISS May/June 2009 (2007 -2009)	Change
Large rise in price of food	19.9	50.5	30.6
Lower crop yields due to poor soil fertility	33.3	44.6	11.3
Short acute illness/accident of HH member	24.3	44.5	20.2
Poor crop yields due to weather/rainfall pattern	23.3	29.9	6.6
Livestock died or were stolen	18.6	26.7	8.1
Large fall in sale prices for crops	7.2	24.0	16.8
Crop diseases or crop pests	13.0	19.4	6.4
Chronic illness, disability or aged of HH member	4.9	17.7	12.8
Theft	11.2	15.3	4.1
Household business failure, non-agricultural	4.9	13.4	8.5
Reduced ganyu opportunities/wage rates	11.3	12.3	1.0
Increased expenditure demands	7.3	11.9	4.6
Dwelling damaged, destroyed	5.3	9.3	4.0
Death of HH member	5.5	8.4	2.9
End of regular assistance, aid, remittances from outside HH	1.5	4.5	3.0
Birth in the Household	4.0	3.9	-0.1
Marriage/Other social events	1.8	3.0	1.2
Other	2.2	3.0	0.8
Break-up of the household	3.1	2.6	-0.5
Loss of salaried employment or non-payment of salary	1.4	1.1	-0.3

Note: Ranked using AISS 2009 figures

Overall it is interesting to note that table 5 shows that the proportion of households reporting major shocks has increased for all types of shock and stress. Given that there were also very high food prices in 2005/6 (within the period reported on in 2007) this may suggest that either people's perception of shocks have changed (so that smaller shocks are considered more serious), or people's resilience to such shocks has improved. Either way, this suggests an improvement in welfare, which is consistent with the information presented earlier in table 4.

6.3 Other rural impacts

A number of other impacts were mentioned in different areas by respondents in Focus Group Discussions and Key Informant Interviews. These include reduced begging (which benefits both poor and less poor people); reduced off farm work (*ganyu*) allowing people to work on longer term and more remunerative tasks and higher *ganyu* wages; higher school enrolments (also attributed to increased school feeding programmes); reduced malnutrition; reduced theft and increased grain storage; improved social relations with less hunger (but also poorer social relations where there was conflict over the allocation of very limited numbers of coupons); and increased investments in houses and businesses

There is also evidence that the AISP is not a new source of intra-household conflict. There are conflicts over the use of vouchers, but it is clear that these conflicts would have been present with or without the voucher. On the whole, a comparison of wage systems and decision-making between vouchers and other types of income (*ganyu*, safety nets including work, safety nets without work requirements, remittances, farm sales, small businesses) suggest that decision-making regarding coupons is shared and is much more equitable than is the case with other income.

The relationship between maize prices and *ganyu* wage rates was highlighted as a particularly important issue in the evaluation of the 2006/7 programme. Changes in maize prices are discussed in more detail in a separate report (Dorward and Chirwa, 2010), but we note here that from 2007 to early 2009 there were very significant increases in maize prices, but these were not accompanied by widespread food shortages or distress sales of livestock as experienced in previous years with equivalent high real prices. Qualitative information from Focus Group Discussions and broad quantitative information from the household and community surveys suggest that *ganyu* wage rates also rose over the same period in nominal terms. Over the period 2005/6 to 2008/9, nominal wages (in MK) appear to have risen by around 80%, with an increase of about 70% from 2006/7 to 2008/9. Changes in real wages can be estimated from changes in nominal wage and maize prices. Wage rates appear to have kept abreast with or just kept ahead of maize price increases over the period from 2005/6 to 2008/9 – but this includes a dramatic rise from 2005/6 to 2006/7, followed by a steady decline.

Indicative modelling of beneficiary and non-beneficiary livelihood effects and more widespread labour market effects of the programme suggest that over the different years poor beneficiary households may have had real income increases of between 10% and 100% over the counterfactual no-subsidy situation, and poor non-beneficiary households may have had real income increases of between 0% and 20% over the counterfactual no-subsidy situation (varying between different areas, between households with different savings behaviour, and between years with different subsidy rates and maize and labour market conditions) (Dorward, 2010).

7. Economic analysis

We now consider the economic benefit cost ratio of the programme as a conventional tool for comparing the economic benefits and efficiency of investments. This is derived from comparison of programme costs with the value of incremental production estimated in Dorward and Chirwa (2010).

Table 6 sets out the economic estimated costs of the programme. The fiscal costs of the programme are adjusted to exclude the costs of displaced fertiliser, further on-farm economic costs are added, and downward adjustments are made to non-tradable costs using a shadow exchange rate to represent the effects of the widely reported over-valuation of the exchange rate (see for example Lea and Hanmer, 2009). Total benefits from the programme are determined by the value of incremental production, which is affected by maize prices, technical returns to on farm input use, and displacement rates. The benefit to cost ratio for the 2008/9 programme is estimated at 0.90 with 10% displacement of unsubsidised fertiliser sales by subsidised fertiliser sales and a maize price of \$280/MT. This maize price is estimated using an average of 'without subsidy' import parity price of \$300/MT and a 'with subsidy' domestic price of \$260/MT (equivalent to just below MK40/kg at an exchange rate of 150MK/\$US). The low returns to investment

in 2008/9 are the result of very high fertiliser prices for the season. Low fertiliser prices in the future should significantly raise returns to levels achieved in previous years.

High international maize prices have to some extent offset the high fertiliser prices. As argued in the report on the 2006/7 evaluation, although high domestic prices also raise the calculated benefit cost ratio from the programme, this ignores the costs to poor consumers of high prices, and high domestic prices depress real growth, poverty reduction and household food security. Therefore although high food prices may lead to calculation of an apparent high economic return to the programme, they are actually bad for the poor and for food security and, as argued in the 2006/7 evaluation report, bad for growth and the real economic benefits of the programme.

Table 6 Estimated programme costs (US\$)

		Cost		
		OER, no displacement	SER, displacement	
Shadow exchange rate (MK/US\$)		140	170	170
Fertiliser displacement		0	20%	30%
Incremental fertiliser used		200,000	160,000	140,000
Programme costs	Incremental fert. (supply & transport)	250,042,822	200,034,258	175,029,976
	Hybrid seed	9,941,161	8,979,113	8,979,113
	OPV seed	913,613	825,199	825,199
	Program implementation	9,798,076	8,849,875	8,849,875
	<i>Total Gross Cost</i>	<i>270,695,673</i>	<i>218,688,445</i>	<i>193,684,163</i>
	Less fertiliser redemption by farmers	22,857,143	18,285,714	16,000,000
	Total Net Cost	247,838,530	200,402,731	177,684,163
Farmer costs	Cost of fertiliser	22,857,143	18,285,714	16,000,000
	Local transport etc in purchasing inputs	14,060,842	11,579,517	11,579,517
	Fertiliser application labour	7,142,857	4,705,882	4,117,647
	Harvest labour	55,705,343	37,385,566	33,140,854
	Extra cost for displaced fertiliser	0	0	5,994,174
	Total farmer costs	99,766,185	77,950,854	70,123,166
All costs	Total Cost	347,604,715	278,353,585	247,807,329

Notes : Fiscal costs are programme costs with official exchange rate (OER) and no displacement. Costs of non-maize seeds and cotton and grain storage chemicals excluded.

50% of programme implementation costs and of seed costs are taken to be non-tradable so the mean of official exchange rate and shadow exchange rate (SER) is applied.

Farmer labour and transport costs from 2.5 million recipients, with 2 days/hh accessing inputs, MK300/hh transport and other costs, 25 days labour/MT harvested etc, 1 days application of fertiliser per bag, 250MK/day wage.

Extra costs of displaced fertiliser are 50% of its transport etc costs and 10% loss in its yield due to later application.

Table 7 examines the sensitivity of benefit to cost ratios, NPV and fiscal efficiency (the NPV divided by the fiscal investment used to obtain that NPV) using different maize and fertiliser prices and yield responses (with for example higher returns resulting from improved crop management and early planting and fertiliser application, or lower returns from weather). The different yield response scenarios provide information on the sensitivity of returns to the precision of the yield response estimates.

Table 7. 2008/9 Economic returns by maize prices, and yield responses

Maize price US\$/MT		Scenario		
		Low	Medium	High
270	Benefit cost ratio	0.722	0.865	0.997
	NPV (US\$ mill)	-80.55	-40.81	-1.07
	Fiscal efficiency	na	na	Na
280	Benefit cost ratio	0.749	0.897	1.033
	NPV (US\$ mill)	-72.65	-31.16	10.33
	Fiscal efficiency	na	na	4.2%
290	Benefit cost ratio	0.776	0.929	1.069
	NPV (US\$ mill)	-64.76	-21.51	21.73
	Fiscal efficiency	na	na	8.8%
300	Benefit cost ratio	0.804	0.961	1.105
	NPV (US\$ mill)	-56.86	-11.86	33.13
	Fiscal efficiency	na	na	13.3%

Note: Calculated with a 10% fertiliser displacement rate

As was found in the 2006/7 evaluation, all three measures of programme benefit and efficiency are highly sensitive to maize prices, yield responses and, as discussed below, to fertiliser prices. The benefit cost ratio is not particularly sensitive to fertiliser displacement rates, but NPV and fiscal efficiency are sensitive to fertiliser displacement rates. The practical implications of this for programme design and implementation are that minimising fertiliser displacement rates, maximising yield responses, and keeping fertiliser prices (and other costs) down are critical for raising returns to the programme. It should also be noted that increasing the scale of the programme is likely to lead to lower returns and lower fiscal efficiency as (a) marginal rates of return to fertiliser use at current levels may be lower than average returns; and (b) increasing scale of the programme is likely to lead to increasing displacement. At the same time the marginal opportunity costs of the programme increase with scale

Looking to the future, it is difficult to predict how maize and fertiliser prices will move. Fertiliser prices have already fallen dramatically from the prices that prevailed when fertiliser purchases were made for the 2008/9 subsidy programme. In the longer run higher oil prices and carbon taxes can be expected to raise fertiliser prices again. Table 8 shows returns from situations with much lower maize prices and with fertiliser prices only 50% of those that prevailed in the 2008/9 season. As shown in the 2006/7 evaluation, the programme can provide high returns with good management, favourable prices and favourable yields. These are challenging requirements.

Table 8. Benefit cost ratios by maize prices and yield responses with lower fertiliser prices

Maize price US\$/MT		Scenario		
		Low	Medium	High
150	Benefit cost ratio	0.649	0.767	0.873
	NPV (US\$ mill)	-62.78	-44.07	-25.35
	Fiscal efficiency	na	na	na
200	Benefit cost ratio	0.869	1.022	1.158
	NPV (US\$ mill)	-23.30	4.17	31.65
	Fiscal efficiency	na	3.4%	25.7%
250	Benefit cost ratio	1.091	1.276	1.439
	NPV (US\$ mill)	16.18	52.41	88.65
	Fiscal efficiency	13.1%	42.6%	72.0%
300	Benefit cost ratio	1.315	1.530	1.717
	NPV (US\$ mill)	55.66	100.65	145.65
	Fiscal efficiency	45.2%	81.7%	118.2%

Figures for 10% displacement, using SER and fertiliser prices 50% of those in 2008/9.

The returns to increasing the volume of subsidised hybrid seed were examined by investigating the effects of an increase in subsidised hybrid seed from the 2008/9 quantity of just over 4,500MT to 9,000MT. Even if 50% of this displaces existing unsubsidised purchases of hybrid seed, this is estimated to raise the BCR from 1.02 to 1.047, the NPV from US\$4.17million to US\$9.68 million and the fiscal efficiency from 3.4% to 7.3% with maize priced at US\$200/MT and fertiliser prices at 50% of 2008/9 prices.

8. Other impacts

There are other potential impacts of the programme that are important but very difficult to quantify meaningfully.

With regard to the environment, the programme should both replenish soil fertility (as nutrients are added to soils that are otherwise being depleted of nitrogen and phosphates through continuous cropping (with maize in pure stand or dominated mixed stands). Higher productivity should also lead to a reduction in the extension of cultivation onto more marginal slopes and soils and into forested land. The importance of such benefits should, however, be taken into account in the design and implementation of the programme and complementary activities and investments.

It is also important, but often difficult, to see the beneficial impacts of the programme in an integrated and holistic way. Earlier discussion of wider market effects has attempted to do that. It should, however, be stressed that as the programme raises land and labour productivity for very large numbers of poor farmers and farms, the extent of land under maize cultivation and of labour employed in that cultivation means that the programme is making a substantial contribution to increases in productivity of major resources in the Malawian economy. It is this that drives the benefits from the programme for GDP growth and the macro economy and leads to potential longer term benefits from lower maize prices, growth and diversification of local economies and reduced food insecurity.

It is also important, however, to recognise that the very substantial benefits from the programme are achieved at considerable cost. As noted earlier, the financial costs of the 2008/9 programme took up a very considerable part of the government budget. Total recorded financial costs of the programme to the government and donors amounted to nearly MK40 billion before recovery of farmer redemption payments, nearly MK34 billion after their recovery. These costs do not allow for a range of other costs incurred by government agencies and their staff involved in implementing the programme, and the lost productivity of these staff who would otherwise be engaged in other productive activities. Some of these costs, and costs

of farmers accessing and using inputs, were allowed for in the total estimated costs used in the economic benefit cost analysis. Some of the activities that are crowded out by the MAISP (such as agricultural research and extension) may provide high if not so immediate returns on investment. The funds used in the programme may also prevent investments in roads, schools or health facilities and services, for example.

To maximise programme benefits it is important that the scale and costs of the programme are tightly controlled to minimise these crowding out effects, and that the resources invested in the programme do yield significant and rapid returns to the country, greater than could be achieved by their investment elsewhere. An important element of this involves ensuring that investments reach the intended beneficiaries and are coordinated with complementary policies and investments that can improve its effectiveness and efficiency, for example by investing in or encouraging rural roads, agricultural research and extension, and the development of efficient, effective and reliable private sector seed and fertiliser supply and distribution systems.

9. Conclusions

Major impacts of the AISP have been analysed in terms of its effects on the input supply sector, macro economic effects, incremental maize production, various aspects of rural welfare, and its economic returns.

Effects on the input supply sector have been mixed, with stimulation of private sector importing and, most importantly, of private sector maize seed supply and distribution. Following useful progress in working with private sector fertiliser distributors, their exclusion in 2008/ had a damaging effect on the development of private sector fertiliser distribution. There is a need to re-evaluate the decision to exclude the private sector from retail distribution of subsidized fertilizer and re-establish dialog/partnership between the public and private sectors.

Positive macro economic effects arise because of the programme's substantial contribution to increased land and labour productivity in maize production, but negative macro economic effects arise from the very large budgetary and foreign exchange demands made by the programme. These occurred particularly in 2008/ as a result of very high international prices for fertilisers. Good macroeconomic management has limited the detrimental effects that increased expenditures on the subsidy might have had on the economy but effects on deficit spending and the price level may turn out to be significant over the coming year.

Using similar yield response rates to those used in the 2006/7 analysis, the incremental production from the 2008/9 subsidy programme is estimated at around 1 million MT. This is considerably greater than the 650,000MT estimated for 2006/7 due to the larger volume of inputs disbursed and lower displacement of smallholder purchases of unsubsidised fertilisers in 2008/9

As compared with a similar survey conducted in 2007, rural welfare improvements are reported in improved food availability at harvest time in 2009, but not in the 2008/9 production season. Subjective welfare and poverty incidence appear to have improved over the same period, and compared to 2004. Ganyu rates and maize availability and prices appear to be important determinants of food security and welfare particularly for poorer people. Indicative modelling of livelihood and labour market impacts of the programme suggest that over the different years both beneficiary and non-beneficiary poor households may have had substantial real income increases as a result of the subsidy, though these will have been considerably smaller for non-beneficiary households.

An economic benefit cost ratio of 0.90 is estimated for the 2008/9 programme, but this estimate is sensitive to maize prices and yield responses used in the calculations and it must be noted that estimation of economic benefit: cost ratios does not capture wider positive gains from the programme. Returns were adversely affected by the high fertiliser prices experienced when importing fertilisers in 2008, but this was offset to a limited extent by higher regional and domestic prices – though the high domestic prices undermine the programme's food security, poverty reduction and growth impacts. Fertiliser prices are likely to fall in the near future, but prices may again rise in the longer term. Controlling the scale of the programme is important for raising benefits (though a large scale programme is still necessary for

achievement of wider beneficial impacts on wages and maize prices not properly accounted for in the benefit cost analysis) and for reducing the programmes' significant opportunity costs (from crowding out other agricultural, health, infrastructure and education investments) and potential macro-economic costs (from its demands for foreign exchange and its impact on the budget deficit). Raising yield responses and reducing displacement continue to be critical for improving programme efficiency and effectiveness. Returns to investment may be improved by increasing the amount of subsidised hybrid maize seed.

In conclusion, it is important to see the benefits and costs of the programme as a whole. Such a large scale programme incurs very considerable fiscal and economic costs, and these can cause difficulties in macro-economic management and crowd out other important and longer term investments. Maximising effectiveness and efficiency, controlling costs, and optimising complementary investments can have very high pay-offs. Design and implementation of the programme need to recognise this, as well as the wider impacts of the programme beyond its direct impacts on beneficiaries receiving subsidised inputs: in raising land and labour productivity for very large numbers of poor farmers and farms, in making a substantial contribution to increases in productivity in the Malawian economy, and in longer term benefits from lower maize prices, growth and diversification of local economies, and reduced food insecurity.

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Glossary of Acronyms and Terms

ADD	Agricultural Development Division
ADMARC	Agricultural Development and Marketing Corporation
agro-dealers	Small scale private input retailers
AISAM	Agricultural Input Suppliers Association of Malawi
AISP	Agricultural Input Subsidy Programme
AISS	Agricultural Input Subsidy Survey
AU	African Union
<i>Bomas</i>	District administrative / commercial centres
CNFA	Citizens Network for Foreign Affairs
CPI	Consumer Price Index
DfID	Department for International Development
Dimba	Wetland cultivated in the dry season
EU	European Union
FEWSNET	Famine Early Warning System Network
FAO	Food and Agriculture Organization of the United Nations
Ganyu	hired casual labour
GDP	Gross Domestic Product
GOM	Government of Malawi
IHS2	Integrated Household Survey (2004)
IMF	International Monetary Fund
LU	Logistics Unit
MASAF	Malawi Social Action Fund
MK	Malawi Kwacha (MK140 to the US\$)
MOAFS	Ministry of Agriculture and Food Security
MRFC	Malawi Rural Finance Company
MVAC	Malawi Vulnerability Action Committee
NASFAM	National Smallholder Farmers Association of Malawi
NEPAD	New Economic Partnership for African Development
NFRA	National Food Reserve Agency
NGO	Non-Governmental Organization
NPV	Net Present Value
NSO	National Statistical Office
OER	Official exchange rate
OPV	Open pollinated varieties (of maize)
PRSP	Poverty Reduction Strategy Paper
RBM	Reserve Bank of Malawi
SER	Shadow exchange rate
SFFRFM	Smallholder Farmers' Fertilizer Revolving Fund of Malawi
SGR	Strategic Grain Reserve
TIP	Targeted Inputs Program