EVALUATION OF THE 2013/14 FARM INPUT SUBSIDY PROGRAMME, MALAWI

PROGRAMME IMPLEMENTATION AND BENEFIT COST ANALYSIS

October 2014

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Executive Summary

This paper sets out the main processes, achievements and estimated outcomes and impacts of the 2013/14 FISP, drawing on implementation records, and different sources of secondary information.

Overall implementation of the 2013/14 FISP appears to have been very similar in scale and outcomes to the previous few years, with similar implementation problems as regards timing of access delivery but, by the end of November, similar outcomes. Subsidised inputs comprised of 149,028MT of fertiliser, 8,268 MT of maize seed and 3,041 MT of legume seed were sold to smallholder beneficiaries throughout the country. Fiscal costs of the supply of these inputs are estimated at approximately US$150 million (MK 64 billion at an exchange rate of 428.50 MK/US$ in February 2014), excluding interest charges for late payments. A net present value of US$89 million is estimated, allowing for direct and indirect impacts, with a benefit cost ratio of 1.49 and fiscal efficiency of 0.60.

However the 2013/14 FISP faced particular external problems in its implementation with the challenges posed to supplier payment with slow government payment systems further restricted as a result of 'post Cashgate' freezing of donor budget support and of payments to suppliers. Consideration of programme costs and longer term outcomes do not take account of the unacceptable and costly impacts of delayed payments to suppliers.

At a deeper level, the vulnerability of the programme to difficulties in government tendering and payment systems and the lack of improvement over the last few years in addressing these and in improving key FISP implementation parameters suggests the need for some radical attention to a number of issues, issues which have been raised repeatedly since the early years of the programme:

- timeliness and scheduling
- improved fertiliser tender procedures
- greater involvement of the private sector in the retailing of subsidised fertiliser
- reduced programme costs
- graduation
- targeting
- agronomic efficiency (or Nutrient Use Efficiency , NUE) and
- wider growth and agricultural and diversification benefits

These issues are closely related with each other and are briefly considered in turn.

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1 Introduction

This report presents information on the implementation of the 2013/14 Farm Input Subsidy Programme (FISP) and preliminary estimates of benefits and costs. The main objective of the evaluation is to contribute to assessment of the impact and implementation of the FISP in order to provide information regarding

- the overall value for money of investments in the FISP as regards its contributions to agricultural production, food security, and farmers' and consumers' welfare
- means by which future implementation of the FISP might be changed in order to improve its effectiveness and efficiency

The evaluation relies heavily on monitoring information from the Logistics Unit as reported in the weekly reports for Task Force meetings and in its final report (Logistics Unit, 2014). This is supplemented with pricing information from a variety of sources and historical information on different aspects of the programme as summarised in Chirwa and Dorward (2013a) and Dorward et al. (2013).

The report is structured in 4 sections. Following this introduction the implementation processes and achievements of the 2013/14 FISP are detailed. Section 3 then considers the outputs and impacts of the 2013/14 FISP, including benefit cost analysis and national food security contributions, before section 4 concludes with a synthesis of the main findings and a discussion of possible means of improving the FISP's implementation, outcomes and impacts.

2 Programme implementation & costs

Implementation of the subsidy programme involves a large number of complex and very significant logistical and organisational tasks with critical seasonal deadlines. In 2013/14 this involved selection of 1.5 million beneficiaries from 4.3 million registered farm households, printing and distribution of 6 million coupons, and purchase and distribution of 3 million bags of fertiliser to tight deadlines, to a large proportion of Malawi's farmers (many of whom are illiterate or semi-literate) widely dispersed across the whole country, some in remote and poorly accessible areas, with the constant temptation and threat of fraud or theft of highly valuable fertiliser worth around MK51 billion (US$118 million) in total.

We present information on the major tasks and stages of programme implementation in terms of input (fertiliser and maize and legume seed) procurement, beneficiary identification and coupon distribution, and coupon redemption. We do not reproduce the detailed information and recommendations provided in the 2014 Logistics Unit Report beyond summarising and drawing attention to critical issues, and relating them to information from other sources and to achievements in previous years. The focus is on issues relevant to *cost effective implementation*, that is implementation achievements that contribute to beneficial impacts from the programme (in terms of beneficiary input access that promotes achievement of FISP's production and food security objectives at minimum cost). This section reports on implementation in terms of delivery and

distribution processes and outcomes relying primarily on information from the Logistics Unit and weekly task force reports.

2.1 Fertiliser procurement and distribution

As has been the case since the 2008/9 season, fertiliser procurement was entirely the responsibility of government, with no retail sales of subsidised fertiliser by private companies. Tendering for fertiliser importation and procurement for fertilisers was initiated with bidding documents issued in mid-April 2013 for public opening in early June. Tender awards were announced in late August. A total of 150,000MT was to be procured, 75,000MTS of NPK and 75,000MTS of Urea. Price differences across suppliers are shown in figure 2.1. This shows quite large variations in prices. For NPK there was a price spread of a little under $140/MT fairly evenly distributed across all suppliers, while for urea there was a slightly smaller spread of just under $120/MT. The spread on NPK is larger than in 2012/13 (just under $120/MT). The 2013/14 spread is however smaller than in 2013/13 for urea (the 2012/13 spread was a little over $140). The low price award to RHIM for NPK to Chirimba was later rescinded and reallocated to other suppliers.

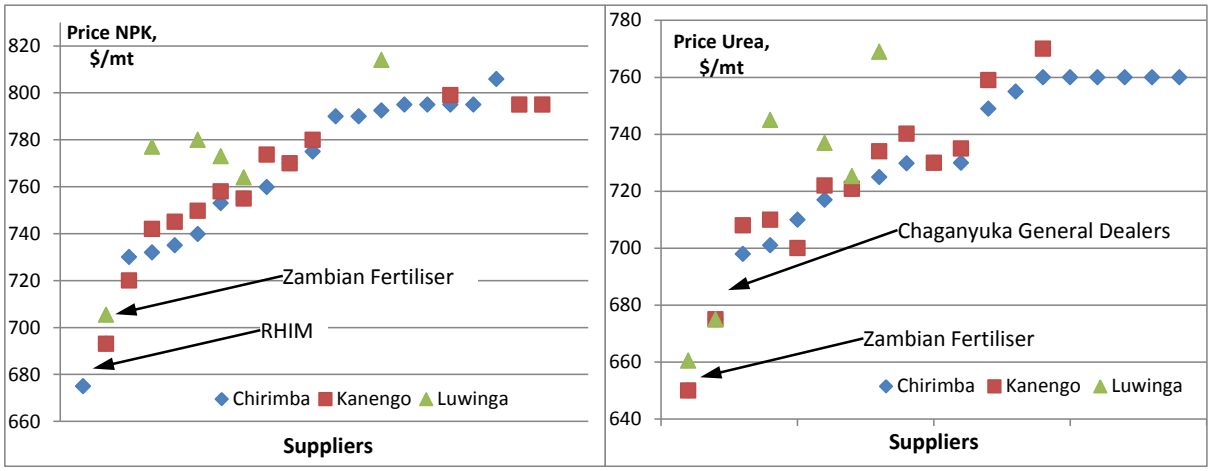

Figure 2.1 2013/14 Mean Fertiliser prices by supplier
Source: Calculations from Logistics Unit, 2014

Figure 2.2 compares unit fertiliser costs incurred by the programme with international prices and market prices starting from the 2009/10 season (as 2008/9 world prices were exceptionally high). International prices fell somewhat in 2013 and this is reflected in prices in the tender awards. The normal position of urea was also re-established (in 2012/13 a higher price was paid for Urea). Data from Amitsa suggests wide variability in retail prices which since 2011 appear to be generally higher than per unit costs under FISP.

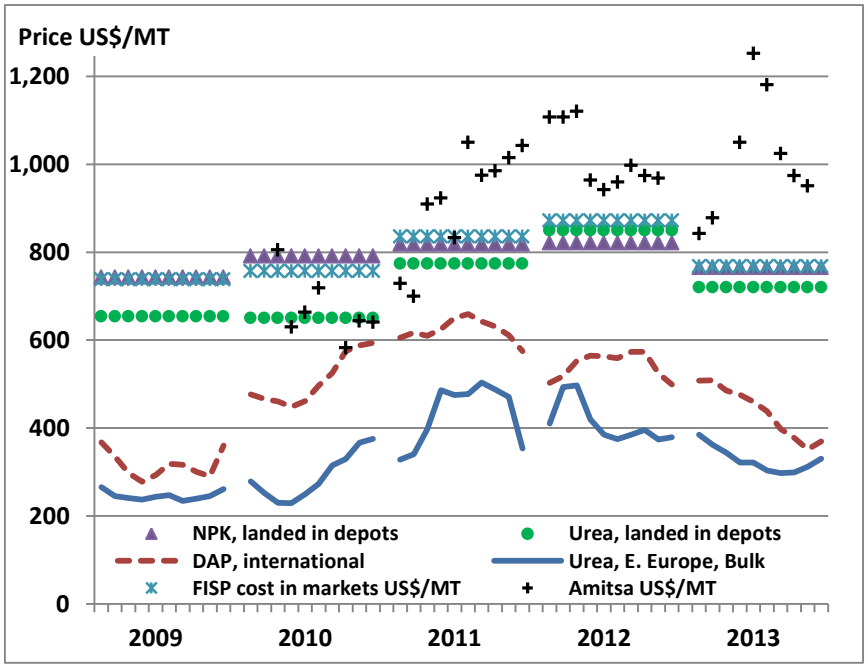

Figure 2.2 Unit fertiliser costs comparisons, 2009/10 to 2013/14

Sources: Calculations from Logistics Unit annual reports; World Bank Commodity Prices; Amitsa.

The breakdown of awards by region and fertiliser type is given in table 2.1. This table shows that 90% of procurement was supplied by private importers (as compared with 82% last year) and 18% by SFFRFM and ADMARC. There were no reported stocks brought forward from the previous season. Figure 2.3 shows a comparison of procurement sources over the life of FISP.

Table 2.1 Fertiliser procurement and availability by region and type (MT)

Fertiliser	NPK	UREA	Total	Share
South	34,395	34,395	68,790	46%
Centre	30,915	30,915	61,830	41%
North	9,690	9,690	19,380	13%
National	75,000	75,000	150,000	100%
ADMARC	2,000	0	2,000	1%
SFFRFM	6,395	6,000	12,395	8%
Private sector	66,605	69,000	135,605	90%

Source: Logistics Unit (2014)

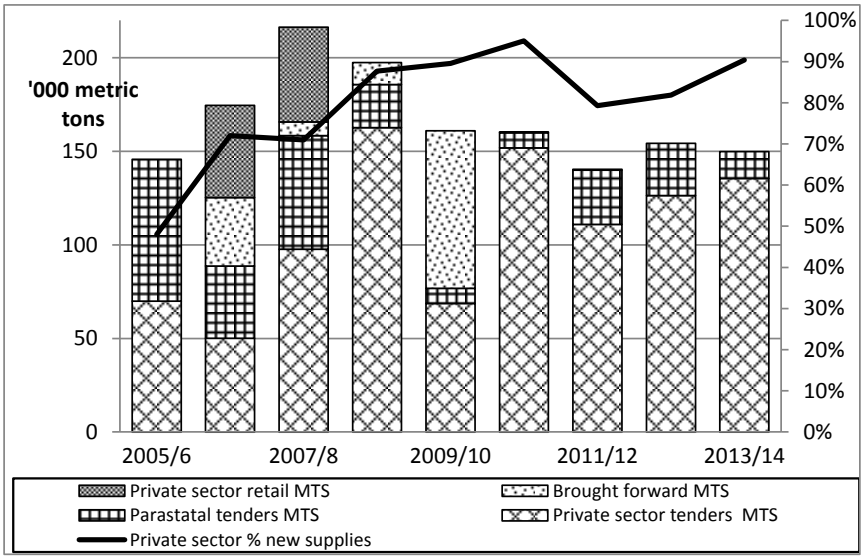

Figure 2.3 Fertiliser sources, 2005/6 to 2013/14

Sources: Calculations from Logistics Unit annual reports, Nakhumwa (2006).

As in previous years, delivery problems arose with insufficient SFFRFM depot space to accommodate incoming stocks. Figure 2.4 shows cumulative deliveries to depots and 'uplifts' from depots to markets for each year of the programme, as a percentage of total parastatal sales. Comparison of 2013/14 with earlier years shows that volumes and percentages of deliveries to depots in 2013/14 lagged considerably behind previous years in October (with all supplies supposed to be delivered by the end of October according to tender contracts) though they had largely caught up by the end of November.

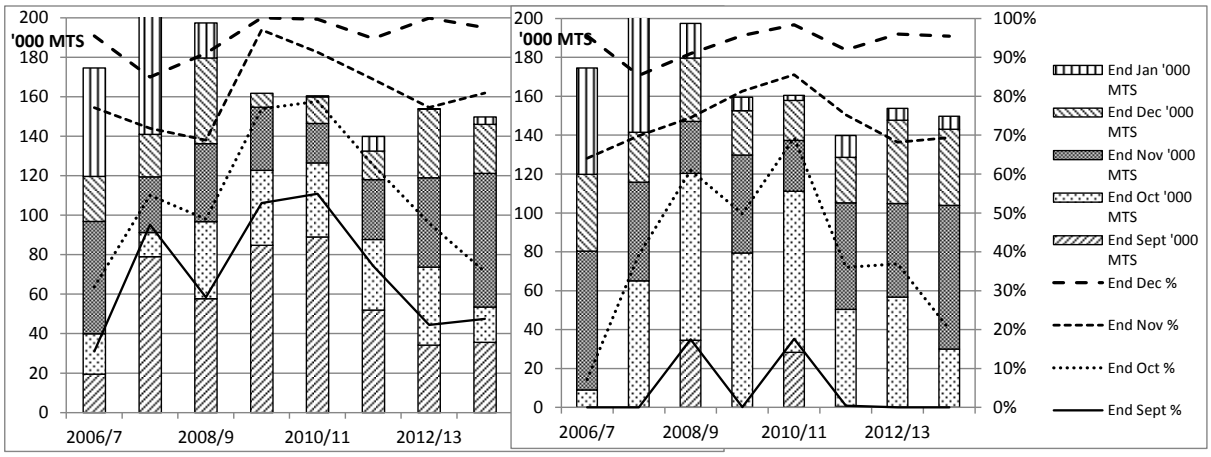

Figure 2.4 Cumulative deliveries to and 'uplifts' from depots by month 2006/7 to 2013/14

(% of final parastatal sales by end each month)

Source: Calculations from Logistics Unit annual and weekly reports

As in previous years uplifts from depots to markets were constrained by stocks in depots and availability of space in markets, but further problems arose with delayed payments to transporters. Thus no deliveries were made in September, and October uplifts were very considerably down on previous years. Again November deliveries largely caught up.

However, very low uplifts (only 20% of final sales) by the end of October are a matter of concern as early access to fertilisers is critical for the achievements of yield benefits from early planting and fertiliser application and to reduce travelling difficulties and demands on farmers' valuable time once the rains have come. Early fertiliser availability is particularly critical for NPK and in the Southern region where the rains generally come earlier. Figure 2.5 therefore shows the % of NPK and Urea deliveries to and uplifts from depots by region by month. This shows that up to the end of October in % terms deliveries in both the South and Centre were lagging behind NPK deliveries in the North, with the Centre particularly poorly served. NPK deliveries were no earlier than Urea deliveries. By the end of November around 20% of NPK deliveries were still outstanding in the South and Centre. Similar patterns are found for uplifts, with some lags, as would be expected. However, at the end of November approximately 25% of NPK uplifts were still outstanding in the South. Late availability leads to disruption of farmers' other activities, and more crowding and queues during input sales, apart from delaying planting and fertiliser applications.

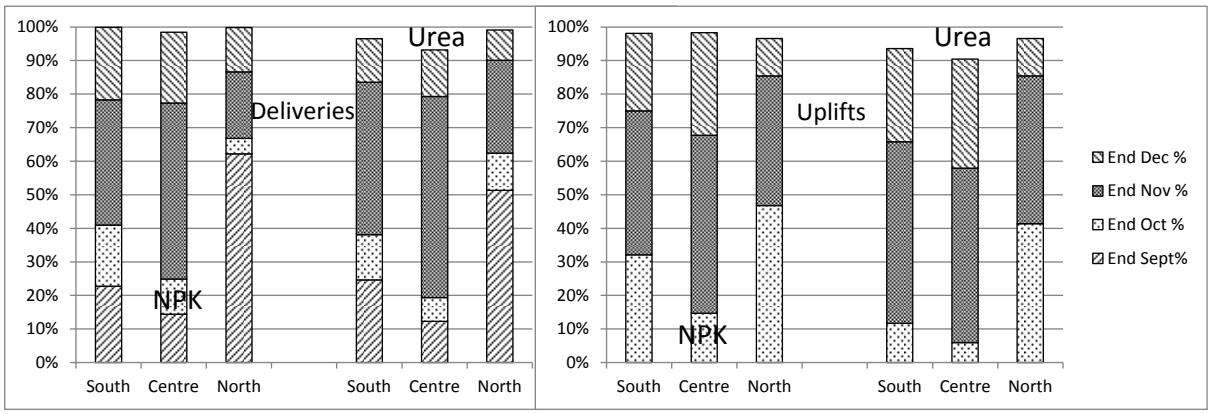

Figure 2.5 Cumulative deliveries to and 'uplifts' from depots, 2013/14 by region by month
(% of final parastatal sales by end each month)
Source: Calculations from Logistics Unit annual and weekly reports

Figure 2.6 presents the timing of other critical activities in 2013/14 (in bold) in comparison with previous years (with earlier achievement, i.e. lower in the graph, being better). Awarding of fertiliser tenders has been discussed above, while completion of voucher allocations and the despatch of lists to districts were delayed by late returns by some districts. Seed supply contracts were, however, finalised in good time. Late opening of markets has also been a contributory factor in previous years: it is not clear how far this was an issue in 2013.

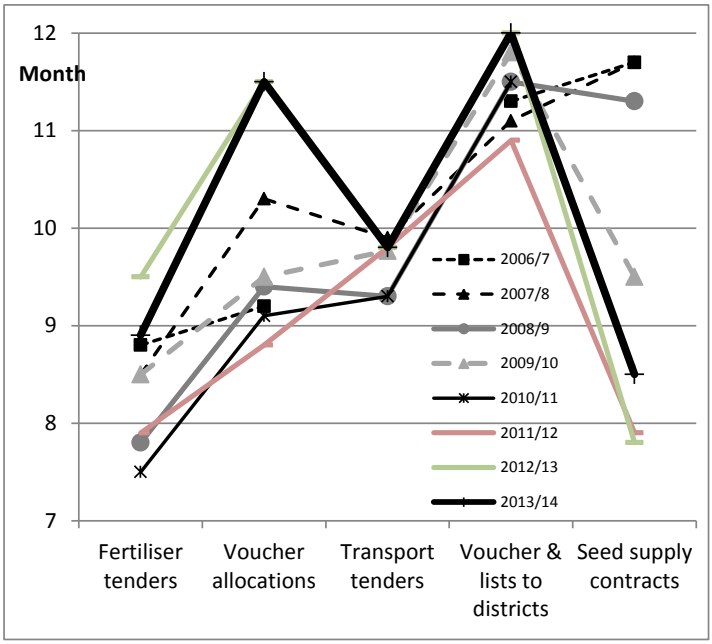

Figure 2.6 Timing of completion of contracts & voucher processes
Source: Calculations from Logistics Unit annual and weekly reports

Logistics Unit (2014) reports a number of problems with the transport contracts. These included late award of contracts, variable rates between transporters, late and low payments, contractual restrictions on quantities and districts of operation, contractual requirements to use vehicles and trailers registered in the contracts, and rising fuel prices. Although some of the contractual restrictions were intended to reduce theft by transporters (a major problem in 2012/13) the effect of all these problems was to severely delay uplifts up from depots to markets, contributing to the delays noted above. There was, however, a significant improvement in security, largely due to the presence of police escorts, and also with the ESOKO system for monitoring consignments' despatch and delivery – though the latter is dependent upon mobile phone signal and consistent implementation by market staff (Logistics Unit, 2014).

A major issue in the 2013/14 programme has been late and non-payment for fertilisers, seeds and transport. While this has been a recurrent problem with the programme, occurring every year, the extent of this in 2014 was unprecedented, as shown in figure 2.7. Prior to 2012/13, delays in payment never exceeded 25%. In 2012/13 there had been substantial delays in paying invoices in November and December, but 90% of invoices were paid by the end of January. In 2013/14, however, systemic problems in the financial system of approvals were not only exacerbated by shortages of foreign exchange, as in 2012/13, but also by extensive controls implemented in the wake of the 'Cashgate' scandal, leading to almost a freeze in payments, with delays also leading to underpayments as a result of errors in payments, a worsening exchange rate, and interest charges due on late payments. As at May 2014, Logistics Unit (2014) estimated approximately MK18.63 billion outstanding (excluding any interest charges), amounting to approximately 30% of the invoiced costs of fertilisers, seeds and transport contracts. The lack of payments to suppliers has potentially devastating effects on these businesses, on the costs of the 2013/14 programme (due to interest due on late payments) and on future programme costs (due to future suppliers building high risk premiums and interest costs into future tenders).

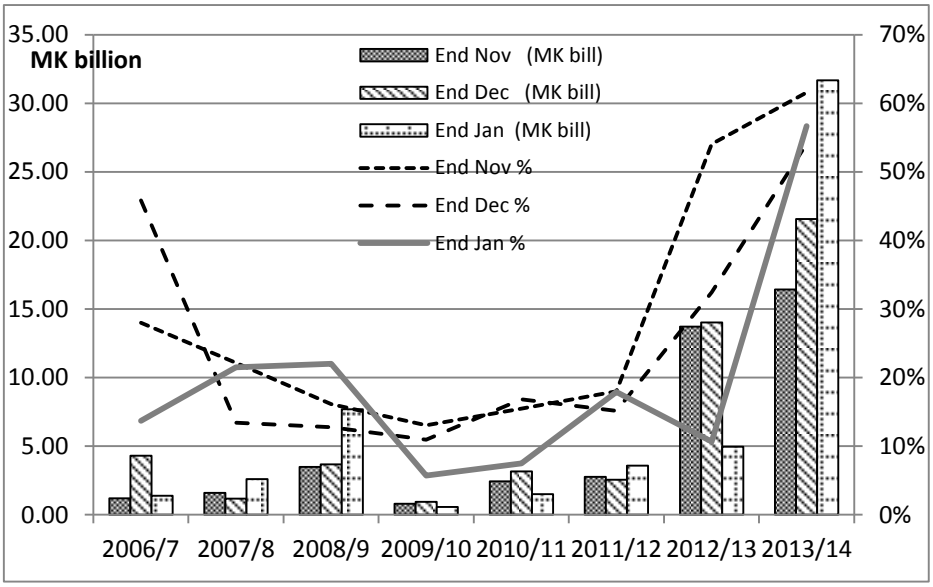

Figure 2.7 Outstanding invoice payments by season
Source: Calculations from Logistics Unit annual and weekly reports

2.2 Seed procurement

Seed companies and government agreed that farmers should be able to buy maize seed with a seed coupon with a maximum MK150 cash top up from farmers, and that these coupons would be redeemed by government for a price of US$10.50 /coupon. Seed companies were responsible for stocking retail outlets (agro-dealers, input supply shops, and ADMARC and SFFRFM markets) with 5kg packets of hybrid seed and 8kg packets of OPV seed. Beneficiaries were also issued with coupons for legume seeds. Again seed companies were responsible for stocking retail outlets with 3 kg packets of soya seed and 2 kg packets of other legume seed (beans, cowpeas, pigeon peas, or groundnuts) for redemption by farmers, with redemption by government at a price of US$5.70 per voucher. Retailers returned coupons to seed companies who were responsible for claiming reimbursement from the Government (through the Logistics Unit).

2.3 Coupon printing, allocation and distribution

Coupon allocation involved updating the farm households register, local (village) processes of selection of beneficiaries, allocation of coupons by district and within district by EPA, printing of coupons, distribution to districts, and issue of coupons to beneficiaries. These activities are critical as regards coordination of numbers of beneficiaries identified, coupon printing and issue, and allocation and transport of fertiliser supplies to markets, with total demand matching fertiliser procurement.

Registers of farm households in all districts were updated in the field from March to September and then cleaned by the Logistics Unit and sent back to districts for checking. This information formed the basis of an initial district allocation of coupons in mid-August, with four coupons per beneficiary to allow each beneficiary to receive a set of subsidised inputs consisting of one hybrid or OPV maize seed pack (5 or 8 kg), one 50 kg bag of NPK, one 50 kg bag of urea, and one legume seed pack. District allocations were subdivided by EPAs and villages using the farm family register in each district, and the EPA and village allocations were distributed to DADOs together with blank registration forms for entry of beneficiary names. This allowed beneficiary identification to start in each district as soon as the farm family register was finalised. Beneficiary lists were then printed by the Logistics Unit with beneficiary details by village and sent to MoAFS, and summaries of fertiliser requirements by market compiled. Table 2.2 shows beneficiary registrations by region.

Table 2.2 Final Beneficiary Registrations by Region (Households)[1]

	Target	% by Region	% Male headed	% Female headed	Unallocated
North	193,800	13%	37%	50%	13%
Centre	618,300	44%	44%	55%	1%
South	687,900	46%	48%	40%	11%
Total	1,500,000	100%	45%	48%	7%

Source: Calculations from Logistics Unit (2014)

As in previous years there is some unevenness in allocations between districts and regions when compared with estimated population. Figure 2.8 compares changes in fertiliser voucher redemption by region per household over the life of the programme, using MoAFS farm family and NSO rural household estimates (note that in 2013/14 each registered beneficiary was supposed to receive two fertiliser vouchers).

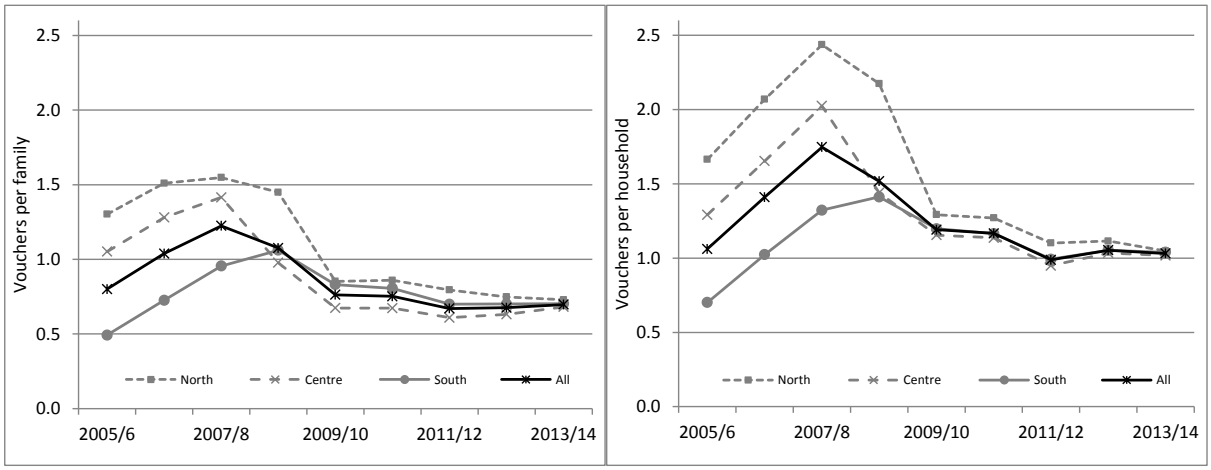

Figure 2.8 Estimates of fertiliser voucher redemption per household by region by year using MoAFS farm family estimates (left) and NSO rural household estimates (right)

Source: Calculations from Logistics Unit annual reports, NSO(2008).

This shows a similar pattern in 2013/14 as in 2012/13. As in 2012/13 we note:

- Significant differences in fertiliser supply over the life of the programme, with it rising from 2005/6 to 2007/8, and then falling back to 2009/10, with roughly similar supply in subsequent years. Overall fertiliser redemptions per NSO rural household in 2013/14 are roughly the same as they were in 2005/6, the first year of the programme, but are lower than in all subsequent years except 2011/12. Redemptions per MoAFS farm family are lower than in 2005/6.
- Marked differences between supply per farm family registered by MoAFS and supply per rural household estimated from NSO census figures, with supply per MoAFS farm family much lower than supply per NSO rural household. This is because MoAFS national farm

[1] It should be noted that it may not be clear if the beneficiary listing distinguishes between male and female heads or male and female recipients.

family estimates are just over 60% higher than NSO rural household estimates. This difference is lower in the southern region and highest in the Central region. MoAFS figures show more farm families in the Centre than the South.

- Declining differences in availability per household between regions. Availability has been highest in the north in all years, but supply to the north declined sharply from 2008/9 to 2009/10. Supply per MoAFS farm family in the central region also shows a very sharp decline form 2007/8 to 2009/10, below supply in the southern region, but supply per NSO rural household is now almost identical for the two regions. The low supply per MoAFS farm family in the central region in recent years is due to very rapid increases in MoAFS central region farm family registrations over the period compared with the southern region

Although commendable rough balance in coupons per rural household or farm family appears to have been achieved across the three regions, this does not appear to be the case across districts, as shown by Figure 2.9, which compares 2012/13 coupon allocations per registered farm family across districts. Allocations are similar to those in 2012/13, with less than 20% of farm families being registered beneficiaries in Chikwawa and Nsanje (presumably due to the relatively lower demand for fertiliser in these districts), and then a range from just over 30% to 55% of farm families being registered beneficiaries in the rest of the country.

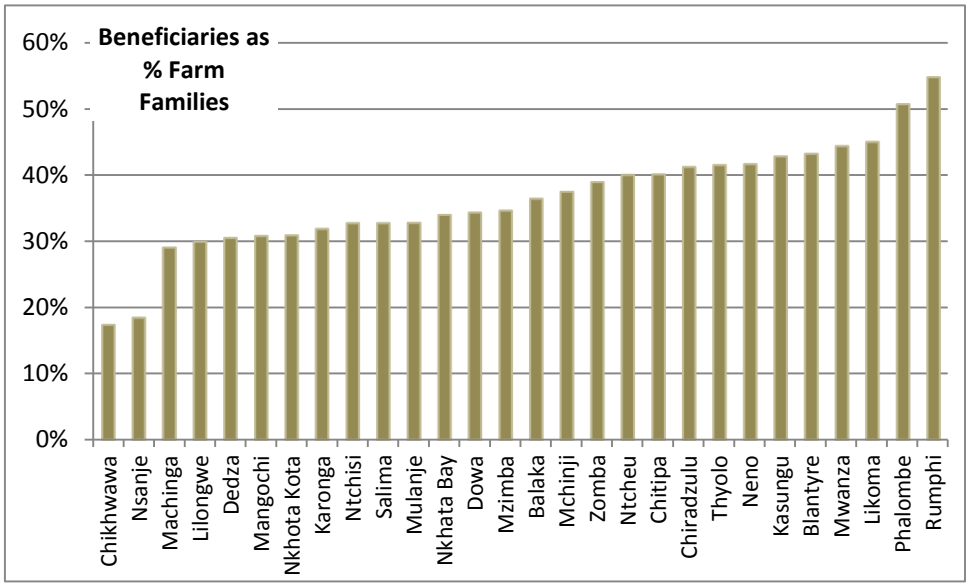

Figure 2.9 2013/14 District coupon allocations: registered beneficiaries as a % of registered farm families

Source: Calculations from Logistics Unit (2014)

Coupon distribution and access depended on the implementation of the formal allocation processes described above. Coupons were despatched to districts and bundled by EPA and village. Tight security measures were followed. There is no evidence that fertiliser coupon distribution exceeded the formal allocations detailed above (a situation that arose with the issuing of supplementary coupons from 2006/7 to 2008/9), and general agreement that the security features of the coupons (whose printing was funded by DFID) were generally effective in preventing fraud.

2.4 Coupon redemption and input sales

Fertiliser coupons had to be redeemed by beneficiaries at ADMARC or SFFRFM markets with the payment of MK500. Seed coupons could be redeemed (without payment or for up to MK150 for hybrid and some OPV packs) at agro-dealers and other input sellers who had made arrangements

with seed suppliers for seed coupon redemption, as well as at ADMARC or SFFRFM markets. A trial using e-vouchers was carried out in a asmall number of Extension Plannng Areas. Sales occurred when suppliers had stocks and beneficiaries had coupons Reported fertiliser and seed sales are detailed in table 2.3.

Table 2.3 Subsidised fertiliser and seed sales

	Fertiliser (MT)	Seed ('000 packs)	
Region		Maize	Legume
North	19,247	191,490	187,207
Centre	90,162	614,445	604,011
South	39,619	684,071	665,807
Total	149,028	1,490,006	1,457,025

Source: Calculations from Logistics Unit (2014)

With the seed coupons, farmers purchased 6,087 MT of hybrid seed and 2,181 MT of OPV seed, together with 3,042 MT of legume seed (comprised of 475 MT of beans seed, 14 MT of cow peas seed, 2,151 MT of groundnuts seed, 384 MT of soya seed and 17 MT of pigeon pea seed). Figure 2.10 shows how subsidised fertiliser and seed sales have changed over the life of the programme.

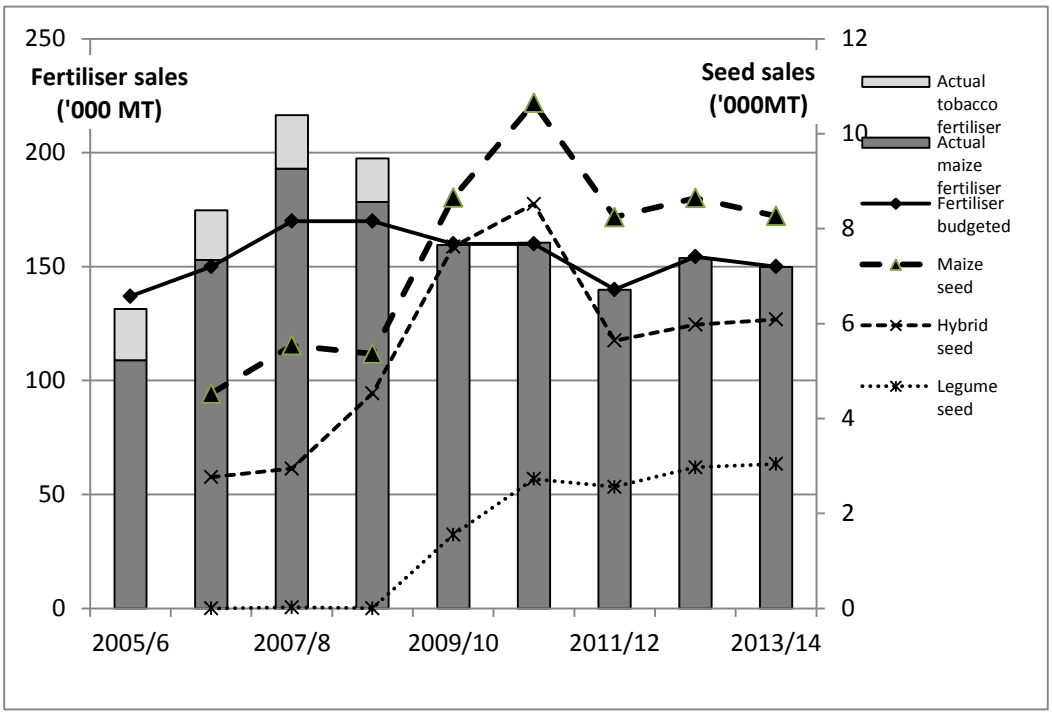

Figure 2.10 Subsidised fertiliser and seed sales by year

Source: Calculations from Logistics Unit annual reports

As figure 2.10 shows, there were large increases in maize and legume seed sales from 2008/9 to 2010/11, with a subsequent fall back in sales of maize seed in 2011/12, but sustained legume seed sales. There was little change between 2012/13 and 2013/14.

2.5 Programme costs

In previous years the overall costs of the programme have been difficult to estimate due to lack of documented administrative costs borne by the MoAFS and other organisations involved in the implementation of the subsidy. Difficulties in establishing actual costs in 2013/14 have been aggravated by the unknown effects of the very large delays in payments, as outlined earlier, and by the holding back of donor funding for various elements of the programme. Estimated costs in figure 2.11 therefore reflect the documented costs of the programme with added estimates of other costs, in an attempt to estimate total programme costs. A detailed cost breakdown from which figure 2.11 is derived is available in Annex 1.

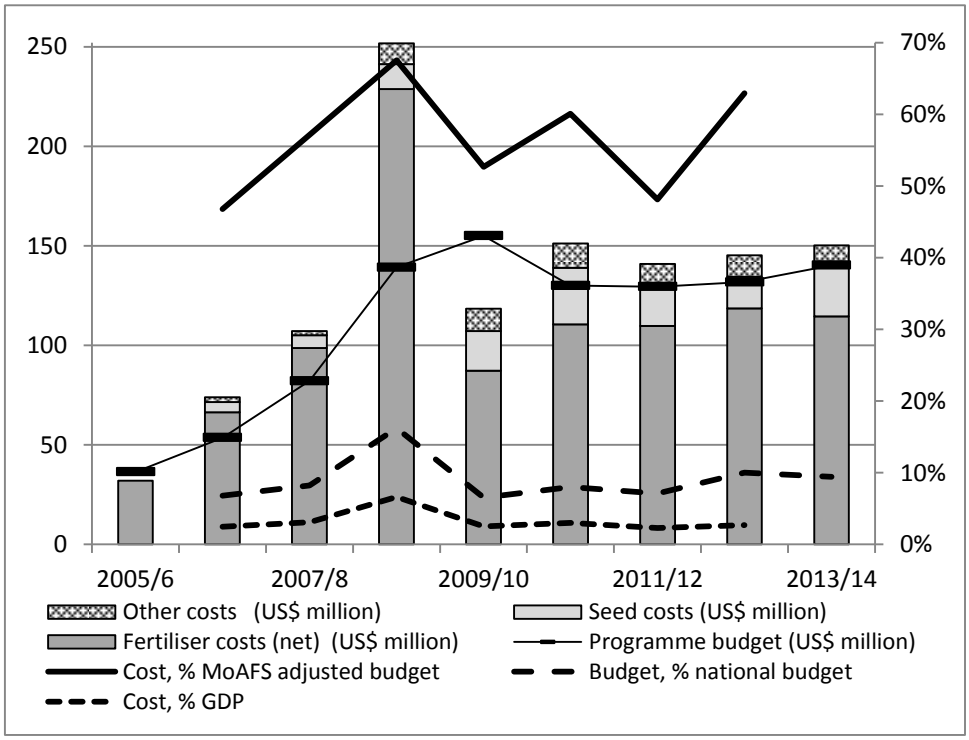

Figure 2.11 Trends in Farm Input Subsidy Costs, 2005/06 – 2013/14

Note: All costs are after deduction of farmers' redemption and include estimated costs.
Sources: Calculations from Logistics Units reports; previous evaluation reports

The following points should be noted regarding figure 2.11.

- Data are presented in US$ because the major devaluation of the Malawi Kwacha in 2012 and early 2013 means that 2012/13 costs are not comparable with early years when the value of the Malawi Kwacha was relatively constant (at 140MK/US$ from 2005/6 to 2009/10, rising to 151 in 2010/11 and 167 in 2011/12). An exchange rate of MK428.5/US$ was used in converting MK budget and expenditure figures in 2013/14.
- The FISP Budget as announced in the national budget is for seed and fertiliser, and therefore should be compared with seed and fertiliser expenditure.
- The total cost of FISP in 2013/14 is estimated at just over US$150 million or MK 64.3 billion, excluding interest charges for late payments.
- The cost of FISP is consistently estimated as over 50% of the MoAFS budget and the FISP budget in the last few years has been between 7% and 10% of the national budget.

Fertiliser procurement has accounted for an average of 76% of total programme costs over the 2011/12 to 2013/14 seasons. One reason for the high expenditure on fertiliser is beneficiaries' small contribution to fertiliser costs. Farmers' redemption payments for fertiliser have fallen from MK950 to MK500 over the life of the programme and over the same period the Kwacha has deprecated against the US$ (from 140 to 420 MK/US$) and international US$ fertiliser prices have also risen. As a result farmer contributions have fallen from approximately 35% to 3% of the cost of delivered fertiliser (including transport but excluding any overhead and administration costs).

This high proportion of fertiliser costs in overall programme costs means that if net fertiliser costs can be reduced through improved tendering procedures and/or through increased beneficiary contributions then there is considerable potential for reducing overall programme costs. For example a 5% reduction in fertiliser prices could reduce programme cost by just around 4% or some US$4.3 million or MK1.8 billion. If in addition farmer contributions were raised to say (as an illustration) MK1,500 per bag (around 10% of total cost), then this could save an additional US$7 million or MK3 billion. Taking these together could save just under MK5 billion or US$11 million (just under 10% of total programme cost). Larger increases in beneficiary contributions could of course save more (although they may also affect the ability of poorer beneficiaries to redeem coupons for fertiliser).

3 FISP impacts

The impacts of FISP are of course critical in determining the value of the programme to the country and government. 'Direct impacts' result from the immediate outputs of the FISP (distribution of fertilisers and seeds to smallholders) and are the benefits that accrue from access to and use of these inputs – increased production and income for beneficiaries and for the country as a whole. Direct impacts depend upon

- Volumes of inputs disbursed
- The extent to which the disbursement of these inputs leads to incremental input use (as some may lead to displacement or crowding out of unsubsidised purchases that farmers would have made anyway)
- The productivity of the incremental inputs

'Indirect impacts' result from the wider effects of direct impacts (increases in production and income) through their effects on spending, consumption and labour supply and demand by beneficiaries and their effects on different markets. We consider these in turn

3.1 Direct impacts

3.1.1 Input disbursement

Volumes of inputs disbursed in the 2013/14 FISP were set out earlier in table 2.4 and section 2.3.

3.1.2 Incremental input use

The effects of input disbursement by FISP on incremental input use have been the subject of a number of different studies. Chirwa and Dorward (2012, p180-183) provide a review of these. Estimates of fertiliser displacement in Malawi have ranged from 3% in 2008/9, a year with very high commercial fertiliser prices (Ricker-Gilbert and Jayne, 2010), to 22% in 2006/7 (Ricker-Gilbert et al., 2010) with a more recent estimate of 15% in 2010/11 (Chirwa et al., 2011).

Jayne et al. (2013) estimate an average displacement rate of 18% across 2004/5, 2006/7 and 2008/9 surveys, but then argue that if the effects of 'diversion' or theft of fertiliser are taken into account then this rises to 51%. Dorward and Chirwa (forthcoming) point out an error in the formula

calculating this – so that on the basis of the figures provided the correct calculation of displacement would be a little lower (45%). Mason and Jayne (2014) implicitly accept this in a correction in a separate paper applying the same methodology in Zambia. There are, however, further difficulties with these estimates: Dorward and Chirwa (forthcoming) note that the assumption that all diverted or stolen fertiliser displaces unsubsidised sales is not tenable and that diversion estimates are also based on the early years of the programme when there were large (and unquantified, unaccounted for) distributions of 'supplementary vouchers" which have subsequently been discontinued, Chirwa and Dorward (2013a) suggest that the estimates do not take sufficient account of the effects of the programme stimulating lagged demand, and there are also significant questions about the method's ability to take account of the effects of high unsubsidised prices on displacement. There is some evidence of falling displacement rates in Malawi (Ricker Gilbert, pers. comm. 2014). School of Oriental and African Studies et al. (2008) also found higher displacement rates with 'tobacco fertilisers' than with 'maize fertilisers', and the former were phased out from the FISP from 2009/10 onwards.

All these issues suggest lower displacement rates after diversion than suggested by Jayne et al. (2013) and we therefore follow Dorward et al. (2013) in taking a most likely fertiliser combined displacement and leakage rate of 30% and consider the effects of higher and lower rates around this.

For seed Mason and Ricker-Gilbert (2012) estimate very high displacement of 56% in Malawi. Dorward et al. (2013) report evidence of substantial growth in commercial sales of hybrid maize seed over the life of the subsidy, and use a most likely fertiliser displacement rate of 50% while considering the effects of higher and lower rates around this. We follow this approach here.

3.1.3 Productivity of incremental inputs

As with displacement rates, there are debates and disagreements regarding the productivity of fertilisers, in particular, on smallholder farms in Malawi. Jayne et al. (2013) report an estimate of 3.32kg of incremental grain per incremental kg of fertiliser (citing Ricker-Gilbert and Jayne (2013)) which translates to an NUE (nutrient use efficiency) of roughly 9.5 kg grain per kg of nitrogen (assuming balanced use of 21:21: 0 NPK and 46% Urea). Dorward and Chirwa (forthcoming) question this on the basis of widely variable estimates of responses in different studies using data from the same surveys on which this estimate is based, and very low yield estimates from these surveys, far lower than can be explained by differences between farmer and GPS area estimates, and the possibility, which needs to be seriously addressed, that consistent downward production estimates lead to a downward bias in fertiliser yield response estimates. Snapp et al. (2014) make important points arguing for the need to place greater emphasis in the FISP on promoting higher fertiliser yield responses, but their consideration of evidence for current responses is patchy[2]. We therefore

[2] We note, for example, that a comparison of yields between different surveys (table 2 in Snapp et al. (2014)) does not recognise the very large differences in yield estimates that are not explained by differences in plot area estimates with different methodologies, and that a comparison of fertiliser response estimates from different surveys (table 1) omits some relevant information from other surveys (for example our calculation of the NUE reported by Chibwana et al. (2010) is 12 to 13 kg per kg N and we cannot find any estimate in Chibwana et al. (2012); there is no reference to the estimate of 9kg grain per kg N in Holden and Lunduka (2010) or of 14kg grain per kg N in Holden (2014); there is no reference to the enduring, lagged yield effects of fertilisers found in Ricker-Gilbert and Jayne (2011), nor of the higher response to subsidised as compared with unsubsidised fertiliser in Ricker-Gilbert et al. (2009); there is no consideration of the counterintuitive Ricker-Gilbert et al. (2009) mean yield estimates which are higher in 2004/5 than in 2006/7). Comments on past lack of profitability of fertiliser on maize may also reflect unfavourable price ratios more than particularly low NUEs (as illustrated later in this report) – again the specifics need to be examined. However Carr (pers. comm.) asks why so many farmers do pay the full price for fertiliser if it is only yielding NUEs of around 9 or 10 kg grain per kg N.

consider it appropriate to continue with consideration of a range of NUE estimates in examination of programme impacts on incremental productivity, as in previous work and in particular Dorward et al. (2013).

3.1.4 Incremental production estimates

Drawing on information on input disbursement, displacement and incremental input productivity, Table 3.1 sets out incremental maize production estimates with different assumptions on each of these issues. We consider fertiliser leakages and displacement together ranging from 10% to 45% (made up leakages from 5% to 20% and displacement from 5 to 25%), estimated NUEs from the crop simulation and cropping methods reported in Dorward et al. (2013) and adjusted downwards by 10% to 30% (with the midpoint representing a rough average of 14.4 and 18.4 for local and hybrid respectively), and seed displacement ranging from 40% to 60%.

Table 3.1 therefore sets out estimated incremental production of maize under these different conditions, with the central cell highlighted, considered to be the most likely and approximate mean. No account is taken of possible post-harvest losses.

Table 3.1 Incremental maize production estimates under different assumptions

Seed displacement	NUE reduction	Hybrid NUE	Local NUE	Fertiliser displacement &leakage 10%	30%	45%
40%	-10%	22.1	17.5	1,005,574	801,864	649,081
	-20%	19.6	15.5	893,843	712,768	576,961
	-30%	17.2	13.6	782,113	623,672	504,841
50%	-10%	22.1	17.5	990,760	*787,050*	634,268
	-20%	19.6	15.5	880,676	***699,600***	563,794
	-30%	17.2	13.6	770,591	612,150	493,320
60%	-10%	22.1	17.5	975,947	772,237	619,455
	-20%	19.6	15.5	867,509	686,433	550,627
	-30%	17.2	13.6	759,070	600,629	481,798

No crop simulation yield information or estimates of displacement are available for estimating the incremental production of legumes from the distribution of subsidised legume seed, and yield estimates are complicated by variable intercropping patterns and, for beans, the picking of leaves as a vegetable. Table 3.2 sets out estimates for incremental production by type of legume, using the yield parameters specified in Dorward et al. (2013) and quantities of legume seed disbursed in 2013/4 (as specified earlier in section 2.4).

Table 3.2 Estimated incremental legume production under yield and displacement assumptions

Seed displacement	Legume crop	Seed supplied (MT)	Yield kg/kg seed		Incremental production	
			Lower	Higher	Lower	Higher
30%	Beans	475	8	10	2,660	3,325
	Cow peas	14	40	60	392	588
	Groundnuts	2,151	8	10	12,046	15,057
	Soya	384	8	10	2,150	2,688
	Pigeon pea	17	90	110	1,071	1,309
50%	Beans	475	8	10	1,900	2,375
	Cow peas	14	40	60	280	420
	Groundnuts	2151	8	10	8,604	10,755
	Soya	384	8	10	1,536	1,920
	Pigeon pea	17	90	110	765	935

3.2 Crop and beneficiary household returns

Table 3.3 sets out estimated net benefits and VCRs (Value Cost Ratios) for the adoption of different subsidised and unsubsidised inputs. Full details of the calculations are set out in Annex A. NUEs used are reduced by 20% from those estimated using the crop simulation model[3]. Estimates are provided for different input adoption combinations, adding fertiliser to local maize, replacing local maize seed by OPV or hybrid maize seed on unfertilised or fertilised plots, or adding fertiliser and replacing local maize seed by OPV or hybrid maize seed (the full subsidy package). Net benefits in MK/ha and VCRs are calculated with two maize prices, MK92.5 per kg (the average 2013/14 maize price predicted by MVAC) and MK75 per kg, a lower price more likely to be achieved soon after harvest. These are lower prices than were expected and experienced in 2013/14 (after the 2012/13 FISP programme) Points of interest from table 3.4 include

- Estimated returns are lower than in 2012/13 due to the lower expected maize prices in 2014/15 and (for unsubsidised input use) higher input prices.
- All *subsidised* options yield extremely high VCRs (for free OPV seed these are infinite).
- For *unsubsidised* inputs VCRs for adoption of hybrid seed instead of local seed *without* fertiliser are over 2, and adoption of hybrid or OPV seed instead of local seed *with* fertiliser achieves VCRs between 1 and 2 - suggesting that the use of unsubsidised fertiliser is marginally profitable on hybrid maize at expected prices for 2014/15 (a VCR of 2 is normally reckoned as the minimum required to make fertiliser application profitable enough for smallholder farmers). This contrasts with more profitable outcomes in 2012/13 and demonstrates the importance of input prices and expected maize prices as determinants of profitability (of course higher NUEs would also allow higher expected returns).
- A 'subsidy pack' of fertiliser applied at average rates would provide a net incremental benefit to subsidy beneficiaries of a little over MK45,000 at a maize price of MK92.5 per kg (or a little over MK30,000 at a maize price of MK75 per kg) – or MK58,000 (at a maize price of MK92.5 per kg) if they bought more unsubsidised hybrid seed. A gain of MK45,000 represents a little under 500 kg of maize per beneficiary household (households getting one fertiliser coupon without or with a maize seed coupon would gain 180 to 380 kg of maize).

[3] Unsubsidised fertiliser prices are average Urea and 23:21:0 prices reported by Amitsa, unsubsidised seed prices are the prices paid by MoAFS to seed suppliers (and may therefore be a slight under-estimate), fertiliser rates and subsidy redemption costs are calculated from the 2012/13 household survey, and wage rates from 2012/13 Lilongwe and Zomba surveys. Costs include transaction costs and incremental field and harvest labour. All estimates take no account of possible post-harvest losses.

This will of course vary with local soil and rainfall conditions and with plot management (principally time of planting, weeding, and plant density).

Table 3.3 Estimated net benefit and VCR of subsidised and unsubsidised inputs

			Subsidised inputs				Unsubsidised inputs			
		Maize price (MK/kg)	*92.5*		*75.0*		*92.5*		*75.0*	
Adoption	From	To	Net benefit	VCR	Net benefit	VCR	Net benefit	VCR	Net benefit	VCR
Fertiliser on Local	Local no fertiliser	Local & fertiliser	31,472	48.7	23,010	39.5	(411)	1.4	(8,872)	1.1
Fertiliser on OPV	OPV no fertiliser	OPV & fertiliser	48,119	57.5	35,404	46.6	7,539	1.6	(5,177)	1.3
Fertiliser on Hybrid	Hybrid no fertiliser	Hyb & fertiliser	52,777	64.5	38,972	52.3	13,492	1.8	(312)	1.5
OPV seed no fertiliser	Local no fertiliser	OPV no fertiliser	5,252	n.a.	3,984	n.a.	2,436	2.4	1,168	1.9
Hyb seed no fertiliser	Local no fertiliser	Hyb no fertiliser	16,639	82.2	12,560	66.7	9,689	3.0	5,609	2.4
OPV seed (no fertiliser)	Local & fertiliser	OPV & fertiliser	19,896	n.a.	15,094	n.a.	14,790	5.0	9,988	4.0
Hyb seed (no fertiliser)	Local & fertiliser	Hyb & fertiliser	39,426	138.5	29,821	112.3	29,714	5.0	20,108	4.1
OPV seed & fert	Local no fertiliser	OPV & fertiliser	53,868	63.8	39,765	51.7	8,850	1.6	(5,254)	1.3
Hyb seed & fert	Local no fertiliser	Hyb & fertiliser	65,790	64.7	48,782	52.5	19,697	1.9	2,689	1.5

Notes: Net benefit MK/ha (allowing for extra labour costs)
VCR = Value to Cost Ratio (ignoring extra labour costs)
No allowance for post-harvest losses

3.3 Indirect impacts

As noted earlier, the FISP has both direct and indirect impacts on Malawi's rural economy. It directly impacts the households that receive input subsidies. If fertilizer subsidies induce farmers to use more fertilizer and stimulate production, the income of beneficiary households rises. However these households also gain income if they sell their coupons or if subsidies displace private input purchases, as farmers pay less for the fertilizer that they would have applied anyway. Whether the FISP induces extra production or displaces existing input use, it indirectly injects a considerable amount of cash into local economies, with beneficiary households the channel through which this cash enters local economies. As FISP households then spend this cash, the program's impacts spread to other households and businesses inside (and outside) the rural economy. Where the FISP leads to higher maize production by beneficiary households, this may lower maize prices, benefiting all consumers, not just beneficiaries. Increases in demand for labour in maize production, increases in demand for non-farm goods and services and, with real income and cash holding gains, decreased supply of ganyu labour may raise wages, benefitting those who hire their labour out. Both increases in wages and falls in maize prices (or a fall in the price of maize relative to wages) tend to favour the poor.

Evidence and arguments for indirect effects comes for a number of sources. There is a long standing empirical literature on growth linkages and multipliers in poor rural economies, where an increase in rural incomes from an intervention (the direct impact of that intervention) leads to wider gains in incomes across the economy. Chirwa and Dorward (2013, p204) draw on this literature to suggest

that a multiplier of 1.4 may be appropriate. Arndt et al. (2013) using a CGE model of FISP impacts estimate indirect impacts of around 60% of direct impacts (a multiplier of 1.6). Dorward and Chirwa (2013) using a partial equilibrium model of the informal rural economy estimate indirect FISP impacts of around 50% and 150% of direct impacts (multipliers of 1.5 and 2.5) in two different livelihood zones in Malawi. Thome et al. (2013) estimate FISP's direct and indirect income effects within rural economies using a LEWIE model and find indirect impacts roughly 20% of direct impacts, and hence a multiplier of approximately 1.2. Taking these results together suggests first that multipliers of at least 1.2 are appropriate and second that the Chirwa and Dorward (2013a) estimate of 1.4 is not at all unreasonable.

3.4 Benefit cost analysis

Benefit cost analysis, looking at both the overall returns to the programme in terms of its wider economic social costs and benefits and at the returns to government investment, has two main functions:

a) to allow comparison of returns to investment across different investment alternatives, and

b) to provide information on features of the programme which are particularly critical to programme returns and which therefore need particular attention in programme design and implementation.

There are a number of challenges in applying benefit cost analysis to the FISP, with difficulties in determining appropriate maize prices and estimates of incremental production, in estimating and allowing for the indirect impacts of the programme, and in establishing meaningful comparisons between returns to the FISP and other types of programme where different analytical methods and assumptions are used in estimating benefits and costs (Chirwa and Dorward, 2013a; Dorward and Chirwa, 2011). The estimates that follow use the same method as Dorward et al. (2013), updated with specific information on the costs, implementation, achievements and outcomes of the 2013/14 programme and with new information, where available, on maize, legume and fertiliser prices.

Table 3.4 summarises the estimated economic costs and benefits of the programme. Costs are divided between programme costs and incremental farmer costs. Incremental production is taken from tables 3.1 and 3.2, using the 'middle of the range' estimates in table 3.1. Farmer costs are based on the figures provided in Annex 2. A multiplier of 1.4 is applied to the estimated incremental consumer surplus, 1.3 applied to the incremental producer surplus, and 1.2 applied to non-rural costs. The estimated returns are similar to though a little lower than those estimated in recent years (Chirwa and Dorward, 2013a; Dorward et al., 2013 ; Dorward and Chirwa, 2012)

Table 3.4 Estimated programme benefits, costs and returns (US$ million)

	Before displacement & leakage	*After displacement & leakage*	*With multipliers*	
Incremental maize production (MT)	1,037,050	699,600	699,600	
Producer surplus, maize	68.21	(24.99)	(32.49)	*1.3*
Consumer surplus, maize	189.20	198.64	278.10	*1.4*
Producer net gain legumes	20.29	20.29	26.38	*1.3*
Total Producer & Consumer gains	277.71	193.95	271.99	
Programme Cost summary				
Fertilisers	118.30	82.81		
less farmer contribution	(3.48)	(2.43)		
Hybrid seed	12.78	6.39		
OPV seed	2.86	1.43		
Legume seed	8.66	8.66		
Other programme costs	9.94	9.94		
Total programme costs	149.07	106.80	128.16	*1.2*
Farmer Cost summary				
OPV seed purchase payments		-		
Hybrid seed purchase payments	0.28	0.14		
Fertiliser purchase payments	3.48	2.43		
Fertiliser transport costs	4.17	2.92		
Fertiliser procurement costs	1.74	1.22		
Fertiliser application labour	4.17	2.92		
Extra harvest labour	48.40	32.65		
Total farmer costs	62.25	42.29	54.98	1.3
TOTAL COSTS	211.32	149.09	183.14	
Benefit Cost Ratio (BCR)	1.31	1.30	1.49	
Net Present Value (NPV)	66.39	44.86	88.86	
Fiscal Efficiency (FE)	0.45	0.30	0.60	

These estimates suggest good economic benefits of FISP, though lower than in 2012/13, and these are likely to be lowered further if interest costs for late payment of supplier invoices are allowed for.

Figure 3.1 provides valuable information on variables that the benefit cost analysis is sensitive to and that are also critical for the achievement of high economic returns, and hence important in programme design and implementation. The figure shows the effects on programme returns from variation in five different variables: fertiliser prices, farmer contributions, displacement and leakages, fertiliser yield response, and maize prices.

In the upper left panel the effects of rising fertiliser prices on BCR and Fiscal Efficiency (or FE, the ratio of NPV to fiscal costs) are plotted on the right hand axis, and on the left the effects on NPV and programme costs. As would be expected, fertiliser prices have a major impact on all these measures of programme performance. It was noted earlier in section 2.5 that a 5% reduction in fertiliser prices could save approximately $4.3 million or 4% in overall costs. The impact of this on the benefit cost analysis would be a nearly $5 million or over 5% increase in net present value and an increase in BCR

and Fiscal Efficiency from base values in table 3.4 to 1.53 and 0.65 respectively (these differences can be seen in the graph by reading off values against the vertical lines connected by a right pointing arrow).

The lower left panel explores the effects of increasing farmer contributions. Assuming that it does not significantly affect farmer uptake and displacement or leakage, raising farmer contributions leads to negligible falls in the NPV or BCR (with the falls due to the multiplier effects of reductions in farmers' net income benefits), but to large falls in programme costs and large increases in fiscal efficiency. In section 2.5 it was estimated that a tripling of farmer contributions to MK1,500 could reduce programme costs by US$7 million. This would have negligible effects on the BCR and NPV but could increase the fiscal efficiency from 0.60 to 0.63[4] (see the vertical lines connected by a left pointing arrow).

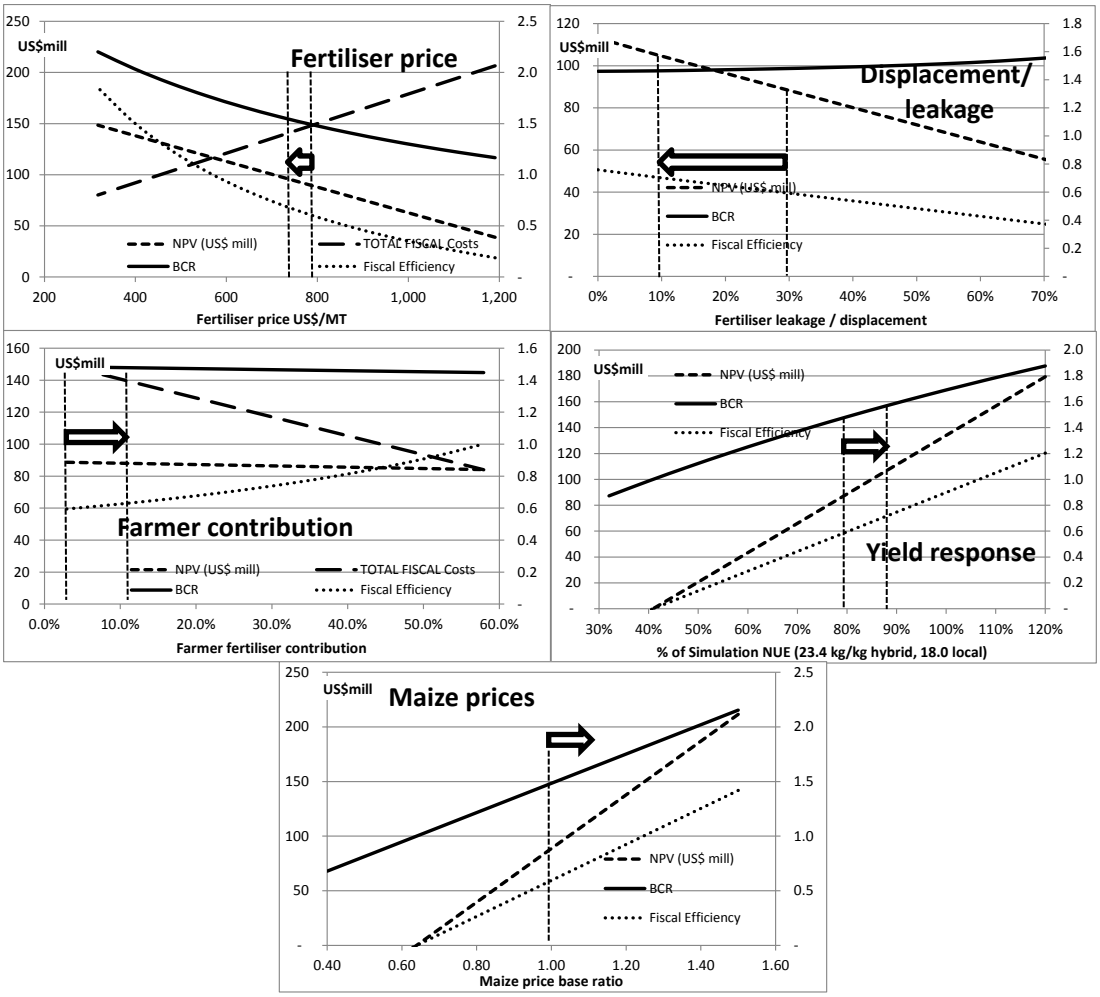

Figure 3.1 Effects of parameters on estimated economic benefits and returns from FISP

Notes: Maize prices as a ratio of prices used in the estimates presented in table 3.4.

[4] This assumes no impacts on poorer farmers' access to inputs or on leakages. Holden and Lunduka (2013) estimate that a drop in subsidy in 2009/10 from 90% to 70% would have led to a fall in the proportion of households willing to purchase subsidised fertiliser from approximately 85% to 70%. However raising farmer contributions may also reduce the value of the coupons and of subsidised inputs, and thus reduce criminal interest in and opportunities for corrupt acquisition of coupons. This would also improve fiscal efficiency.

Turning to the upper right panel, high levels of displacement do not appear to reduce the BCR, but this is misleading if we are interested in the efficiency of government spending, as the calculation of the BCR ignores the costs of fertiliser that is displacing existing commercial purchases, treating it as a social transfer. The falling NPV is however being generated by a constant level of government expenditure, and the result is falling fiscal efficiency and reduced effectiveness of government expenditure in delivering social benefits. Reducing displacement and leakage, for example through improved control and better targeting would therefore lead to significant improvements in programme effectiveness and efficiency. Thus a reduction in displacement and leakage from 30% to 10% could increase incremental maize production by 25%, and NPV to 105 million (an increase of 19%) with an increase in Fiscal Efficiency from 0.60 to 0.70 (see the vertical lines connected by a left pointing arrow).

The lower right panel of figure 10.1 shows the effects of changes in yield response to subsidised fertiliser with steady falls in FE, NPV and BCR. Increasing yields, of course, substantially improves programme achievements. Thus if the NUE were to increase by 10% this could lead to a 20% increase in the NPV (from US$89 million to US$107 million) with increases in the BCR and Fiscal Efficiency from 1.49 and 0.60 to 1.57 and 0.72 respectively) - see the vertical lines connected by a right pointing arrow.

Finally, the bottom panel shows the sensitivity of estimated returns to the programme to changing general (with and without) subsidy maize prices[5]. The benefits of the FISP rise in the context of higher general maize prices.

3.5 National food security

The likely effects of the FISP on national food security were considered in some detail in the 2012/13 report (Dorward et al., 2013). Particular emphasis was given in that report to consideration of the effects of the FISP on food security in the context of population growth which leads to continued increases in Malawi's demand for domestic consumption of maize. Consideration of what production and surpluses or deficits there might have been in the absence of FISP suggested that the FISP may have played an important role in reducing the need for imports.

We repeat this analysis in figure 3.2. This sets out estimated national production, consumption needs and deficits and surpluses from the 2001/2 marketing season to 2014/15. Consumption needs are estimated by multiplying the annual population by 193 kg maize per person, with population figures taken from the 2008 census reports and population projections. Production estimates are from annual MoAFS crop estimates for maize, but these have been adjusted downwards by 10% from the 2007/8 marketing season (2006/7 production season) onwards to provide some allowance for likely over-estimates of production (as suggested by comparison of these estimates, discussed for example by Chirwa and Dorward (2013a). The domestic surplus or deficit is then calculated as the difference between production and consumption. The situation without the FISP is estimated with production represented by MoAFS estimates (adjusted as above) for each subsidy year less estimates of incremental subsidy production from previous evaluation studies.

[5] This shows the effects of identical proportional increases in with and without subsidy prices. Increases in 'without subsidy' prices raise both producer and consumer benefits from the subsidy, whereas increases in 'with subsidy' prices raise producer benefits but reduce consumer benefits.

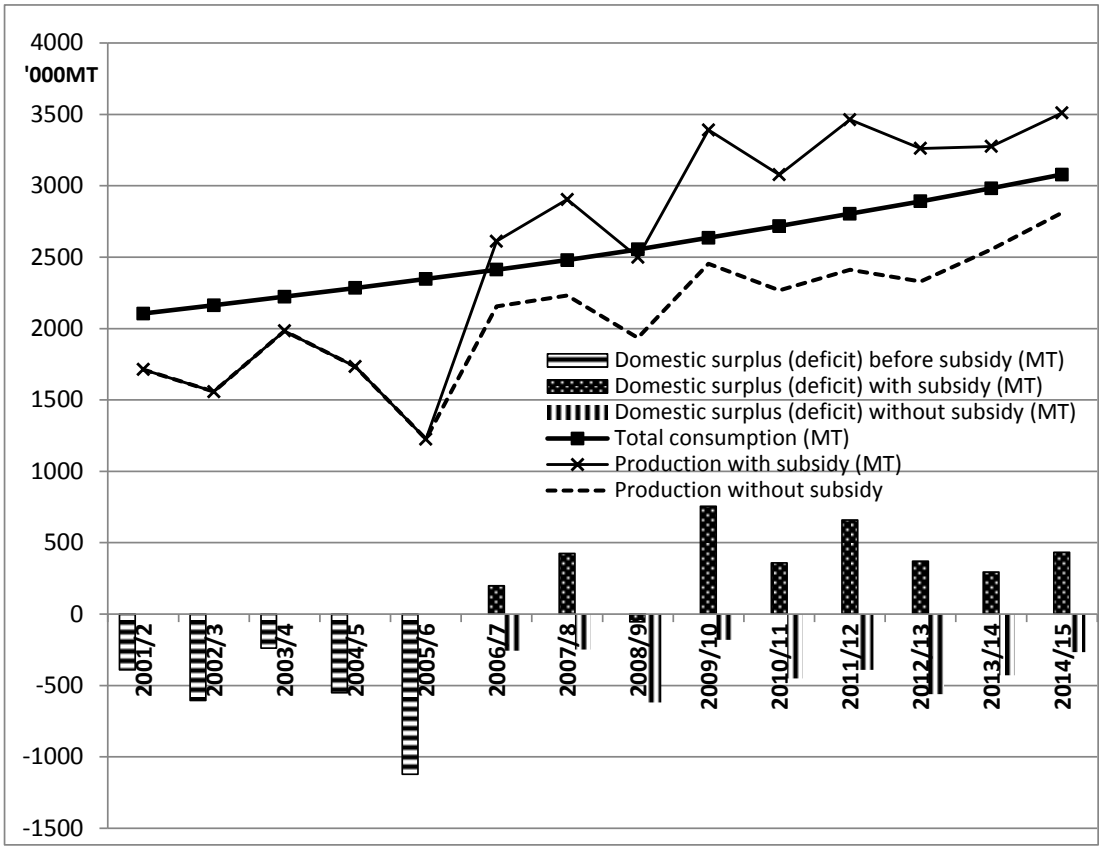

Figure 3.2 Estimated consumption, production and surplus/deficit with and wthout subsidy by marketing year

Sources: (National Statistics Office, 2008, 2009), MoAFS Crop Estimates, Evaluation studies.

Although there is considerable uncertainty about the accuracy of these figures, we suggest that the general picture is clear – the estimated surpluses for the FISP years are wiped out in the 'no FISP' scenarios and replaced by deficits: the programme is estimated to have saved an average of around 385,000 MT of imports per year over its life and around 430,000 MT of imports in the 2013/14 market season, with savings of around 270,000MT imports in 2014/15. Figure 3.2 poses a critical question: how could maize production have changed without FISP, to turn persistent pre-FISP deficits into surpluses while consumption demands are increasing with population growth of around 3% per year - giving (at constant per capita consumption) an increase in national demand of nearly 17% every five years and of 31% from 2005/6 to 2014/15?

This analysis suggests that the FISP has played a substantial role in promoting national food security in the past. The value of saved imports from the 2007/8 to 2014/15 market seasons is estimated at between 90% and 105% of FISP programme costs depending on the use of domestic or SAFEX import prices for valuing maize imports. This analysis does not allow on the one hand for (subsidised) sales income from imported maize sales or on the other for the benefits of households having more local access to maize, the dangers of reliance on often late imports, or the long term social, economic and health costs of periods of widespread food shortages and high prices. However it must also be recognised that the emergence of a seasonal regional export market as discussed in Dorward et al. (2013) poses challenges to the FISP's continued role in supporting national food security, if a large part of the surpluses it generates are exported. This, however, is a threat to national food security in either the presence or absence of FISP.

4 Summary and conclusions

This paper has set out the main processes, achievements and estimated outcomes and impacts of the 2013/14 FISP, drawing on implementation records, and different sources of secondary information.

Overall implementation of the 2013/14 FISP appears to have been very similar in scale and outcomes to the previous few years, with similar implementation problems as regards timing of access delivery but, by the end of November, similar outcomes. However, in 2013/14 the FISP faced particular external problems in its implementation with the challenges posed to supplier payment as a result of 'post Cashgate' freezing of donor budget support and of payments to suppliers. Consideration of programme costs and longer term outcomes do not take account of the unacceptable and costly impacts of delayed payments to suppliers.

At a deeper level, the vulnerability of the programme to difficulties in government tendering and payment systems and the lack of improvement over the last few years in addressing these and in improving key FISP implementation parameters suggests the need for some radical attention to a number of issues, issues which have been raised repeatedly since the early years of the programme (see for example School of Oriental and African Studies et al. (2008)). These issues are closely related with each other and we consider them briefly in turn. We do not attempt a detailed discussion as these issues have been widely discussed, in past evaluation reports, in Logistics Units reports, in Task Force Meetings, in past evaluation workshops, and at the July 2014 National Conference on FISP.

Timeliness and scheduling is one area in need of improvement. Despite widespread recognition of the need for timely access by farmers to subsidised inputs (for higher yield responses, for reduced time and resources spent redeeming inputs, for completion of transport in remote areas before the arrival of the rains, and to reduce opportunities for fraud by selling agents), figure 2.4 showed that there has been limited and inconsistent progress in improving timeliness of uplifts of fertilisers to markets by the end of October – with dramatic improvements from 2006/7 to 2010/11, but subsequently dramatic declines since then. The late timing of fertiliser uplifts is related to 2013/14 (and 2012/13) late tender awards for fertiliser purchases and transport, and late completion of beneficiary lists and finalisation of district voucher lists – as compared with previous years (see figure 2.6) and with long standing recognition of the need for earlier scheduling (Logistics Unit, 2014; School of Oriental and African Studies et al., 2008). Only with finalisation of seed supply contracts has there been significant and sustained improvement in timely contract finalisation (see figure 2.6). While some of these delays are due to inherent elements of the system (such as the timing of the national budget) and others have been affected by wider political and economic changes and challenges in recent years, it must be a matter of concern that the programme remains vulnerable to these issues, and it should be a matter of some urgency to find ways to reduce this vulnerability.

Improved tendering procedures could allow earlier fertiliser deliveries, as discussed above. However shorter periods between closing dates for tenders and their award and faster payment procedures in US dollars would also reduce the risks and costs faced by companies making tenders, and hence reduce the prices in submitted tenders.

Greater involvement of the private sector in the retailing of subsidised fertiliser could offer substantial benefits as regards improved timeliness in the supply of fertilisers to beneficiaries. The seed supply system offers important lessons here (although it does not depend on imports or involve such large sums). However, provided that initial tender systems could be finalised earlier (and there are challenges here not only in the timing of initial tenders but also in developing competitive systems, a challenge that is not addressed in the seed supply system), there should be opportunities for greater efficiency with outsourcing of the logistics to smaller scale, specialist operators. Such outsourcing faces other challenges – in terms of auditing and monitoring to prevent fraud and to ensure quality service provision, and systems to reduce risks of large carry-over stocks

– but these are not insurmountable if given attention. On the other hand there are a number of other potential benefits from such outsourcing – reduced Ministry of Agriculture and police time in logistical and transport operations, the use of private sector storage (overcoming the SFFRFM storage constraints that slow down early deliveries year after year), the potential for arranging payment at times when the Malawi Kwacha is likely to be stronger (rather than the current system's payment at times when it is very weak), and the use of private sector involvement to promote the development of a stronger, more efficient private sector supply system with consequent lower costs for unsubsidised supplies. Chirwa and Dorward (2013b) provide a detailed consideration of issues related to private sector involvement in the FISP, summarised in a policy brief in Chirwa and Dorward (2012).

Programme costs are another issue where there have been mixed but, in recent years, limited gains. As figure 2.11 shows, prior to 2009/10 cost control was very poor with costs substantially over budget from 2006/7 to 2008/9 due to weak physical control of subsidised fertiliser sales and, in 2008/9, exceptionally high fertiliser costs. However since 2009/10 and particularly since 2010/11 programme costs have been consistently higher than in 2006/7 2007/8 (in US$ terms) despite smaller subsidised fertiliser sales. While higher fertiliser international prices may be partly responsible for this, there is no evidence of falling margins between landed and international prices, (see figure 2.2) while farmer contributions have fallen from around 35% to around 3% of total fertiliser costs. Improved contractual and payment systems in fertiliser acquisition (with greater private sector involvement as outlined above) could help to reduce costs, as could increased farmer contributions (as argued in sections 2.5 and 3.4).

Graduation, the progressive improvement of beneficiaries livelihoods and of their rural economies so that they no longer need subsidy support, is receiving increasing political and policy attention but has not been a focus of programme design and implementation to date. It is, however, critical for both controlling longer term costs programme costs and for promoting longer term growth benefits from the programme. Graduation is discussed in some detail in Chirwa and Dorward (2013a) and Chirwa et al. (2013), and in a policy brief in Chirwa et al. (2012).

Targeting is closely related to graduation, as graduation systems require improved targeting. The effectiveness of targeting has been examined in a number of different studies, with consistent findings of large exclusion and inclusion errors. While there have been some improvements in systems (with measures to increase transparency and accountability and to improve the access of vulnerable groups to facilities and services at markets) and in outcomes (for example in the targeting of female headed households), substantial difficulties remain, and hence substantial opportunities for improvement. These are addressed in a separate paper (Matita and Chirwa, 2014), but we note here the potential for reducing displacement (and hence fiscal efficiency) and increasing incremental production and poverty reduction and growth benefits (and hence BCR, NPV and Fiscal Efficiency) with improved targeting and better integration with social cash transfer targeting.

Agronomic efficiency (or Nutrient Use Efficiency , NUE) is another issue requiring attention (see for example Snapp et al. (2014)). This is widely recognised as regards difficulties in assisting farmers with extension advice on fertiliser and seed use, and in the diversion of staff time in administration of the FISP at the expense of extension activities. Outsourcing of logistics (as discussed earlier) and of beneficiary targeting (Matita and Chirwa, 2014) have important potential for freeing up staff time and attention for provision of extension services, and more timely farmer access to seed and fertilisers could also improve seed and fertiliser productivity. Greater attention is also required to integrated soil fertility management as regards erosion control and complementarities between organic and inorganic contributions to soil fertility, and aspects of this (such as greater cultivation of legumes) in turn require promotion of wider growth and diversification to develop local markets (Chirwa et al., 2012; Chirwa and Dorward, 2013a; Chirwa et al., 2013).

Wider growth and agricultural and diversification benefits have not been a focus in the objectives, design and implementation of FISP. This is unfortunate, as FISP, especially with productivity improvements and cost reductions, has unique potential to drive forward wider agricultural and non-agricultural growth (Chirwa and Dorward, 2013a; Dorward et al., 2013). There could therefore be benefits from improved effective coordination of FISP and other agricultural and non-agricultural policies (for example regarding maize price and wage policy, export policy, nutrition, rural infrastructural development or rural education and growth investment).

Glossary of Acronyms and Terms

ADD	Agricultural Development Division
ADMARC	Agricultural Development and Marketing Corporation
AISAM	Agricultural Input Suppliers Association of Malawi
AISP	Agricultural Input Subsidy Programme
AISS	Agricultural Input Subsidy Survey
AU	African Union
BCR	Benefit Cost Ratio
Bomas	District administrative / commercial centres
Chitowe	23:21:0 fertiliser
CNFA	Citizens Network for Foreign Affairs
CPI	Consumer Price Index
CSI	Coping Strategy 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
FCS	Food Consumption Score
FE	Fiscal Efficiency (the ratio of NPV to fiscal costs)
FGD	Focus Group Discussion
FISP	Farm Input Subsidy Programme
FISS	Farm Input Subsidy Survey
Ganyu	hired casual labour
GDP	Gross Domestic Product
GOM	Government of Malawi
IHS2	Second NSO Integrated Household Survey (2004/5)
IHS3	Third NSO Integrated Household Survey (20010/11)
IMF	International Monetary Fund
LU	Logistics Unit
MASAF	Malawi Social Action Fund
MK	Malawi Kwacha
MOAFS	Ministry of Agriculture and Food Security
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
NUE	Nutrient Use Efficiency (kg incremental yield per kg applied)
OPV	Open pollinated varieties (of maize)
PRSP	Poverty Reduction Strategy Paper

RBM	Reserve Bank of Malawi
SFFRFM	Smallholder Farmers' Fertilizer Revolving Fund of Malawi
SGR	Strategic Grain Reserve
TIP	Targeted Inputs Program
VCR	Value Cost Ratio

Appendix 1: Detailed programme cost breakdown (Million US$)

	2005/6	2006/7	2007/8	2008/9	2009/10	2010/11	2011/12	2012/13	2013/14
Exchange rate, MK/US$	140.00	140.00	140.00	140.00	141.31	151.55	166.71	364.92	428.50
Recorded costs									
Seeds - flexi / legumes	0.00	0.00	1.89	5.24	2.83	6.66	6.26	4.89	8.66
Seeds – maize	0.00	5.23	4.58	7.33	17.13	21.64	15.12	11.01	16.09
Cotton chemicals	0.00	0.00	0.24	n/a	0.00	0.00	0.00	0.00	0.00
Fertiliser b/f from y-1	0.00	0.00	11.82	24.88	35.17	0.00	0.00	0.00	0.00
Fertiliser - new supply	51.62	61.16	77.60	237.63	57.18	115.28	112.63	119.52	114.47
Fertiliser - private retail	0.00	17.43	24.53	0.00	0.00	0.00	0.00	0.00	0.00
Transport Costs	n/a	4.76	5.99	9.24	6.33	5.95	5.54	3.70	3.82
Logistics Unit operations	n/a	0.37	0.42	0.24	0.21	0.34	0.38	0.36	0.28
ADMARC operations	n/a	n/a	0.00	0.06	1.06	2.24	1.57	1.11	1.11
SFFRFM operations	n/a	0.75	1.41	n/a	n/a	2.05	0.98	0.90	0.90
District financing	n/a	0.19	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Coupon production	n/a	0.11	n/a	n/a	n/a	n/a	n/a	0.09	0.09
Communications	n/a	0.20	n/a	n/a	n/a	n/a	n/a	0.01	0.00
Input quality monitoring	n/a	0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a
M&E	n/a	0.29	n/a	n/a	n/a	n/a	n/a	0.23	0.23
Buyback finance fees	0.00	0.39	n/a	0.00	0.00	0.00	0.00	0.00	0.00
Total recorded costs	***51.62***	***90.92***	***128.58***	***284.63***	***119.92***	***154.16***	***142.53***	***141.83***	***146.38***
Less: Farmer redemption due	19.62	17.02	21.32	23.12	11.43	10.59	8.39	4.22	3.50
Unused stock (exc. buyback)	0.00	0.00	0.00	19.83	0.00	0.00	0.08	0.46	0.14
Net recorded Costs	***32.00***	***73.90***	***107.26***	***241.68***	***108.49***	***143.57***	***134.06***	***137.87***	***142.74***
Estimated other costs									
Brought forward stocks	0.00	0.00	n/a	0.62	1.76	0.00	0.00	0.00	0.00
MoAFS operations	n/a	n/a	n/a	7.86	7.78	7.26	6.60	6.60	7.26
ADMARC/ SFFRFM	n/a	n/a	n/a	1.26	n/a	n/a	n/a	n/a	n/a
Voucher printing	n/a	n/a	n/a	0.14	0.14	0.13	0.12	n/a	n/a
Other agencies' costs	n/a	n/a	n/a	0.23	0.23	0.21	0.19	0.19	0.21
Total est. other costs	*n/a*	*0.00*	*0.00*	*10.11*	*9.91*	*7.60*	*6.91*	*6.79*	*7.47*
Total net costs, recorded & estimated	***n/a***	***73.90***	***107.26***	***251.79***	***118.40***	***151.17***	***140.97***	***144.66***	***150.21***
Total costs, recorded & estimated exc. stock cf	***n/a***	***90.92***	***128.58***	***274.91***	***129.83***	***161.76***	***149.36***	***144.20***	***150.08***
Programme budget	***36.43***	***53.57***	***82.14***	***139.14***	***155.04***	***129.99***	***129.48***	***131.81***	***140.25***
Funding									
Direct Donor Support	0.00	9.51	7.13	37.75	17.48	22.05	44.85	17.56	7.55
Balance: Malawi Government	n/a	64.39	100.13	214.04	100.92	129.12	95.84	127.11	142.66
Cost, % MoAFS adjusted budget	n/a	46.8%	57.2%	67.6%	52.7%	60.1%	62.8%	62.9%	0.0%
Budget, % national budget	n/a	6.8%	8.2%	16.2%	6.5%	8.0%	10.0%	10.0%	9.4%
Cost, % GDP	n/a	2.5%	3.1%	6.6%	2.5%	3.0%	0.0%	2.7%	

Appendix 2 Farm level budgets for input use with and without subsidy

					From (base) To (actual) *Adoption*	Local no fert Local & fert *fert*		Local no fert OPV no fert *OPV seed*		Local no fert Hyb no fert *Hyb seed*		Local & fert OPV & fert *OPV seed*		Local & fert Hyb & fert *Hyb seed*		Local no fert OPV & fert *OPV & fert*		Local no fert Hyb & fert *Hyb & fert*		OPV no fert OPV & fert *fert*		Hyb no fert Hyb & fert *fert*	
Incremental inputs & costs						kg	MK	kg	MK	kg	MK	kg	MK	kg	MK	kg	MK	kg	MK				
Seed	OPV		@MK/kg		0	-	-	8.5	0	-	-	15.4	0	-	-	13.4	0	-	-	0.0	0	-	-
	Hybrid		@MK/kg		20	-	-	-	-	13.1	262	-	-	18.3	367	-	-	12.8	257	-	-	0.0	-
Fertiliser																							
	N	kg/ha				33.2		-		-		-		-		40.4		39.6		40.4		39.6	
	P2O5					8.3		-		-		-		-		12.2		11.4		12.2		11.4	
	NPK 23:21	kg/ha				39.5		-		-		-		-		58.1		54.3		58.1		54.3	
	Urea	kg/ha				52.3		-		-		-		-		58.8		58.9		58.8		58.9	
	Cost	MK/kg		10	Cost MK		919		-		-		-		-		1,169		1,132		1,169		1,132
Transport etc			8	hrs/bag @	75		1,102		-		-		-		-		1,403		1,358		1,403		1,358
			250	MK/bag			459		-		-		-		-		585		566		585		566
Fertiliser application			0.16	hrs/kg @	75 MK/hour		1,102		-		-		-		-		1,403		1,358		1,403		1,358
Extra harvest labour			0.2	hrs/kg @	100 MK/hour		9,670		1,449		4,663		5,489		10,977		16,118		19,437		14,532		15,777
Total extra costs							*13,252*		*1,449*		*4,925*		*5,489*		*11,344*		*20,678*		*24,108*		*19,092*		*20,191*
Incremental yield		kg/kg seed			OPV	-	-	8.5	72	-	-	17.8	274	-	-	8.5	114	-	-	-	-	-	-
		kg/kg seed			Hybrid	-	-	-	0	17.8	233	-	-	30.0	549	-	-	17.8	228	-	-	-	-
		kg/kg fert				5.3	484	-	0	-	0	-	-	-	-	5.9	692	6.6	744	6.2	727	7.0	789
		Total Incremental yield (kg/ha)					484		72		233		274		549		806		972		727		789
Gross benefit @			92.5	MK/kg			*44,724*		*6,701*		*21,564*		*25,385*		*50,770*		*74,546*		*89,898*		*67,211*		*72,968*
Net benefit MK/ha @			92.5	MK/kg maize price			31,472		5,252		16,639		19,896		39,426		53,868		65,790		48,119		52,777
VCR							48.69		#DIV/0!		82.22		#DIV/0!		138.52		63.76		64.73		57.49		64.47
Net benefit MK/ha @			75	MK/kg maize price			23,010		3,984		12,560		15,094		29,821		39,765		48,782		35,404		38,972
VCR							39.48		#DIV/0!		66.66		#DIV/0!		112.31		51.70		52.49		46.61		52.27
Unsubsidised prices																							
Seed	OPV	@MK/kg			551		-		4,686		-		8,497		-		7,386		-		-		-
	Hybrid	@MK/kg			902		-		-		11,829		-		16,530		-		11,587		-		-
Fertiliser	mixed	Cost MK/kg			357		32,801		-		-		-		-		41,750		40,416		41,750		40,416
				MK/kg maize price																			
Net benefit MK/ha @			92.5				(411)		566		5,073		11,399		23,263		5,902		15,175		7,539		13,492
VCR							1.36		1.43		1.82		2.99		3.07		1.52		1.73		1.61		1.81
Net benefit MK/ha @			75	MK/kg maize price			(8,872)		(702)		993		6,596		13,658		(8,201)		(1,832)		(5,177)		(312)
VCR							1.11		1.16		1.48		2.42		2.49		1.23		1.40		1.31		1.46

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