The Malawi Agricultural Input Subsidy Programme: 2005-6 to 2008-9[1]

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Abstract

Malawi's implementation of a large scale agricultural input subsidy programme in 2005/6 and subsequent years has attracted significant international interest. This paper reviews the background, processes, achievements and outcomes of the programme over the period 2005/6 to 2008/9. The very large scale disbursement of heavily subsidised fertilisers and (mainly hybrid and composite maize) seed to very large numbers of beneficiaries across the country represents a significant logistical achievement and led to significant increases in national maize production and productivity, and this has contributed to increased food availability, higher real wages and wider economic growth and poverty reduction. However the latter years of the programme have also been accompanied by very high international fertilizer prices and costs and by high maize prices, the latter undermining the programme's food security, poverty reduction and growth benefits for the majority of Malawian farmers, who are very poor and rely on purchased maize for significant amounts of their staple food requirements. Estimated economic returns to the programme have been satisfactory, given other benefits of the programme not captured in cost benefit analysis. With substantial reductions in both prices and subsidised volumes of fertilisers in subsequent years, there is considerable scope for building on achievements to substantially raise programme effectiveness, efficiency and benefits. Any application of Malawi's subsidy experience to other countries needs to take account of special characteristics of the Malawian maize economy and of measures needed to raise such programmes' effectiveness and efficiency and ensure their best fit with and contribution to sustainable development policies.

Introduction

This paper describes the background, processes, achievements and outcomes of the Malawi agricultural input subsidy programme from 2005/6 to 2008/9[4] , with occasional reference to 2009/10 implementation. Following this introduction we provide some important background about constraints and opportunities facing Malawi's agriculture and the role of agriculture in people's and the nation's livelihoods. This is followed by a description of the core and changing elements, processes and implementation achievements of the programme over its first four years. The outcomes of the programme are then discussed in terms of estimated impacts on incremental input use, input supply system development, production, productivity, food security, poverty reduction, welfare and economic growth. The paper concludes with a discussion of the effectiveness, efficiency and sustainability of the programme and its benefits, and of wider applicability of lessons outside Malawi.

Background

Agriculture and maize are critically important to the Malawian economy and to the livelihoods of most Malawian people, but this when combined with low agricultural and maize productivity leads to high incidence of poverty and national and individual/household food insecurity with large numbers of very poor people working on very small areas of land which are predominantly planted to maize. Table 1 provides some key indicators of this.

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[4] The Malawi Agricultural Input Subsidy Programme (AISP) has recently been renamed the Farm Input Subsidy Programme (FISP). This paper uses the former name, as applied over the period that we report.

Agricultural, rural and national economic development in Malawi are constrained by a number of interacting household, local and national vulnerability, poverty and productivity traps illustrated in figure 1.

- Continual cultivation of maize on the same land without addition of organic or inorganic fertilizers leads to low yields which in turn lead to inability to afford the purchase of inputs. Most farmers are also not able to buy inputs on credit because of under developed credit markets and the high costs of credit administration, high risks for both borrowers and lenders, consumption rather than sale of produce (and hence lack of cash for repayment), and high input prices and access costs as a result of low volumes of input demand, poor infrastructure, and high transport costs.
- High variability in maize prices also contributes to risks in input use.
- Low demand for inputs itself raises input costs and inhibits the development of input supply systems in less accessible areas.
- Poverty and vulnerability to a wide variety of shocks (low crop yields, high food prices, sickness, and loss of employment or remittance income) further constrain productivity and investment in productive activities – and women, who play a key role in agricultural production and rural livelihoods, tend to be particularly vulnerable to these shocks.
- Investments in maize market development are constrained by low traded volumes and thin markets (as large quantities of maize produced in Malawi are consumed within households and villages and do not reach the market) so that relatively small changes in national production may lead to large changes in market supply and, with relatively inelastic demand, this leads to high price variability.
- High price variability for this critical commodity leads to government intervention in maize markets (this has involved, for example, setting of minimum and maximum prices, export bans, and bans on private trade) but difficulties that governments face in designing and implementing such interventions mean that they often increase price variability for maize sellers, buyers and traders (see for example Chapoto and Jayne, 2010), inhibit investment and participation in markets, and exacerbate the problems they are designed to address.

Table 1: Background Information on Smallholder Agriculture, 2004/5

	North	Center	South	National
Rural population (% total national population)	10	38	40	88
Income and Poverty				
Median expenditure/capita (MK '000)	17	20.9	16.9	17.5
Poor households (% rural pop)	56	47	64	52
Nutrition and Food Security				
Mean rural daily per capita consumption (kcal): poor	1,738	1,811	1,703	1,746
Incidence of stunting in children (% 6 mths - 5 years)	39.6	47.9	40.8	43.7
Incidence of underweight children (% 6 mths - 5 years)	16.1	20	17.2	18.3
Share of calories from own production	0.53	0.58	0.47	0.52
Median month own food exhausted after 04/05 harvest *	NA	NA	NA	4
Suffered large rise in food prices last 5 years (%)	NA	NA	NA	79.2
Smallholder Agriculture				
Landholdings less than 0.5 ha /hh(%)	12.1	15.4	25.4	19.9
less than 1.0 ha /hh(%)	31.4	40.6	54.1	46.2
Suffered crop yield loss last 5 years (%)	NA	NA	NA	68.8
Maize growers (%)	93	97	99	97
Access to credit for food crop inputs (%)	2.5	4.2	3.0	3.4
Percentage of smallholder farmers purchasing fertilizer (%)	37	44	39	41

Source: SOAS (2007) using data from IHS2 2003/4 survey except * (calculated from NSO (2006)). $1 = MK140 for most of the period covered in this paper.

The result of the various negative feedbacks described above (and shown by red arrows in figure 1) is a vicious circle of low maize productivity and unstable maize prices inhibiting (a) net producers' investment in maize production, (b) net consumers' reliance on the market for maize purchases, and (c) poor consumers exits from

low productivity maize cultivation. The result is a lock-in to widespread cultivation of low productivity maize which, because of its scale, depresses wider labour and agricultural productivity and also inhibits the growth of the non-farm economy.[5]

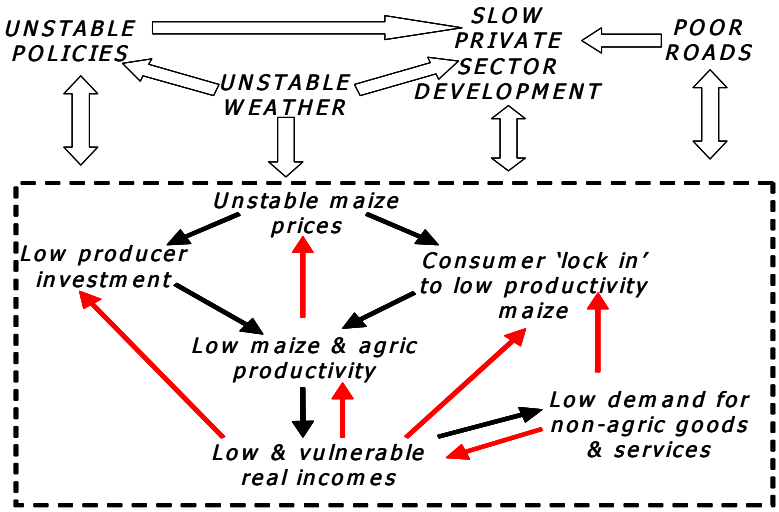

Figure 1 Vicious Circle of the Low Productivity Maize Production Trap*

* Red arrows represent feedback effects

Increased use of inorganic fertilisers and of hybrid and open pollinated maize varieties are one important, widely recognised and, in principle, relatively simple way of increasing maize productivity. However widespread use of fertiliser on maize by smallholder farmers is constrained by the problems of *profitability* and *affordability*. From the mid 1990s to the mid 2000s unsubsidised fertiliser use was not generally profitable on maize produced for sale in Malawi, although it was more profitable on maize grown for own consumption (due to farmers' fears of the effects of a bad year on maize purchase prices)[6]. For poorer farmers, however, affordability of fertiliser is a major problem as they face both a 'hungry gap' during the cropping period (when they need to invest labour, seed and other inputs in crop production, but also need to earn off farm income as food stocks from the previous season run out) and very high borrowing costs and a lack of low cost input finance services. Household hungry gap problems are exacerbated by depressed wage rates and asset prices and high food prices in the rural economy.

Improving the *profitability* of fertiliser use in maize production requires lower fertiliser prices (as a result either of greater efficiency in fertiliser supply and lower importation and distribution transport costs or of a subsidy), higher maize prices, and/or greater efficiency in the use of fertiliser (raising the grain output: N ratio)[7]. High maize prices are a two edged sword, however, as 10% of Malawian maize producers are net sellers of maize, while 60% are net buyers of maize (SOAS et al, 2008) so that most (particularly poorer) people's livelihoods and food security are damaged by high maize prices. Changes to maize prices and improved efficiency of fertiliser use will not, however, improve the *affordability* of fertiliser for large numbers of poor rural households in Malawi (indeed higher maize prices exacerbate affordability problems for net buyers of maize –

[5] Some elements of this analysis are not universally accepted, nor is this summary a complete account of the many issues involved. Explanations for high dependency on maize include different crops' calorific yields per ha in different agro-ecologies, dietary preferences, processing and storage considerations, farmers' familiarity with the crop, and government policies promoting maize production. Poor macro-economic management also constrained growth before 2005, with high real interest rates and inflation, and large Kwacha devaluations.

[6] The post-harvest value to cost ratio (VCR) has generally been less than 2 (often considered the minimum required to make fertiliser use profitable in moderately but not highly risky situations (Morris et al, 2007), and even for higher pre-harvest maize prices has more often than not been around or below 2 (SOAS et al, 2008). Higher VCRs are possible with higher yield responses to fertiliser use (Maize Productivity Task Force, 1997).

[7] A ratio of 15 kg maize per kg N of fertiliser was used in the calculations cited above. Improved crop management and use of hybrid seed could increase this to 22 or more and thus address the profitability problem - but this would not address problems with affordability.

Dorward, 2006). This requires the development of low cost and accessible financial services and/or very large reductions in fertiliser prices. The development of such financial services for fertiliser use in maize production requires that maize be profitable, that smallholders have other sources of cash income that can be used to can repay fertiliser loans when the majority of the maize they produce is for home consumption, and that very low-cost systems are used for loan disbursement and recovery. All these are difficult, and this explains the longstanding and often contentious emphasis on agricultural input subsidies in Malawi (and in many poor rural economies) in the past (complementing but also competing with investment in infrastructure to reduce agricultural input and output marketing costs and improve smallholders' access to markets, in agronomic research and extension). Thus from the mid 70s to the early 90s government financed a universal fertilizer subsidy, subsidized smallholder credit, and controlled maize prices. This system began to break down in the late 80s/ early 90s and collapsed in the mid 90s but there was then a widespread perception that falling fertilizer support was leading to declining maize production and a food and political crisis. Seed and fertiliser subsidies shifted from universal price subsidies to free provision of small 'starter packs' initially to all households (in 1998/99 and 1999/2000) and then to more limited (but varying) numbers of targeted households (from 2000/2 to 2004/5) (see for example Harrigan, 2003). Continuing severe food security difficulties despite these subsidies, particularly after the poor 2004/5 production season, led to significant political emphasis on larger subsidies and building on 2004 election manifesto commitments, the Malawi government decided to implement in 2005/6 a very large scale input subsidy programme across the country.

The Agricultural Input Subsidy Programme: Processes and Achievements

Core elements of the 2005/6 programme that have continued in subsequent years have been its use of vouchers or coupons to target approximately 50% of farmers in the country to receive fertilisers for maize production, with further vouchers for tobacco fertilisers and for improved maize seeds. 'Maize fertilisers' were provided in a package of one voucher for a 50kg bag of 23:21:0 +4S basal fertiliser and one voucher for a 50kg bag of urea (the equivalents for the much smaller number of tobacco farmer beneficiaries were compound D and Calcium Ammonium Nitrate, CAN). Improved maize seeds subsidised under the programme were initially only open pollinated varieties (OPVs) but there has subsequently been much greater emphasis on hybrid maize varieties supplied by a range of seed companies operating in Malawi. The seed and fertiliser packages drew on long standing Ministry of Agriculture and Food Security (MoAFS) technical recommendations for maize and tobacco production.

Coupons are distributed to districts and within districts to Extension Planning Areas in two rounds with the first round allocation in earlier years broadly in proportion to cropped maize and tobacco areas and (in later years) farming population. Within districts Traditional Authorities (TAs), local government and MoAFS staff have had varying roles in coupon allocations between villages and, within villages, worked with Village Development Committees and other local stakeholders to identify recipients to receive two coupons for redemption at very reduced cash prices, for inputs specified on the coupon. There has been considerable variation over time and between areas in the criteria determining prioritization and selection of beneficiaries, numbers of people receiving coupons, and numbers of coupons received per recipient household. Criteria and systems for subsequent supplementary rounds of coupon allocation and distribution later in the season are less clear but are intended to respond to problems of pressures from unmet demand in the first round distribution. There have also been different systems for coupon redemption for different inputs (seed and fertiliser) in different years, with varying involvement of parastatal and private sector input retailers (these systems are discussed below).

The programme's core objective has been to increase resource poor smallholder farmers' access to improved agricultural inputs in order to achieve food self sufficiency and to increase resource poor smallholder farmers' incomes through increased food and cash crop production. The 2005/6 programme was politically very popular and widely considered to have been successful, and was consequently continued in subsequent years, with a number of changes in design, scale and implementation between years. Principal programme features from 2005/6 to 2008/9 are shown in table 2.

Three aspects of implementation achievements are considered: innovation and adaptation, scale, and performance indicators.

Innovation and adaptation: The subsidy programme has built on and emerged from Malawi's innovative experience in implementing universal starter pack and targeted input programmes (TIP) from 1998/99 to 2004/5 (see Levy, 2005). These involved substantial logistical challenges and system development with large

scale registration and targeting of farmers across the country, experimentation with systems using vouchers, and coordination across different government, parastatal, private sector, donor and community stakeholders. However, the AISP also involved substantial changes: in objectives (from social protection and food security for vulnerable households to national food production and self sufficiency[8]); with much greater scale (increasing from around 50,000 mt of fertiliser in 2004/5 to 130,000 mt in 2005/6); with cash redemption of vouchers; and with the addition of tobacco inputs.

Table 2 Principal programme features, 2005/6 to 2009/10

		2005/6	2006/7	2007/8	2008/9	2009/10
Fertiliser voucher distribution (mt equivalent)		166,156	200,128	216,000	195,369	160.000
Households receiving one or more fertiliser coupons		n/a	54%	59%*	65%	n/a
Subsidised 'maize' fertiliser (mt)		108,986	152,989	192,976	182,309	161,495
Subsidised 'tobacco' fertiliser (mt)		22,402	21,699	23,578	19,969	0
Total subsidised planned		137,006	150,000	170,000	170,000	160,000
fertiliser sales (mt) actual		131,388	174,688	216,553	202,278	161,495
Redemption price (MK/50 kg bag)		950**	950	900	800	500
Voucher value, approx (MK/bag)		1,750	2,480	3,299	7,951	3,841
Subsidy % (approx)		64%	72%	79%	91%	88%
Subsidised maize seed (MT)		n/a	4,524	5,541	5,365	8,652
% Hybrid seed		0%	61%	53%	84%	88%
Cotton seed (mt)		0	0	390	435	0
Legume seed (mt)		0	0	24	n/a	1,551
Cotton chemicals vouchers		0	0	131,848	n/a	0
Total programme	planned	5,100	7,500	11,500	19,480	n/a
cost (MK million)	actual	7,200	12,729	16,346	39,847	17,140

* Seed or fertiliser coupon (NSO, 2009b)

** MK950 per bag of 'maize fertiliser', MK1,450 per bag of 'tobacco fertiliser'

Sources: Logistics Units reports; 2005/6 (CISANet), 2006/7 (SOAS et al) and 2007/8 (MoAFS) evaluation reports; key informants; MoAFS Implementation guidelines; GoM budget statistics; 2008/9 survey results; NSO (2009b).

Throughout the AISP, the government and other stakeholders (donors, fertiliser and seed industry, and civil society) have worked with varying success and agreement on further innovations to address difficulties, to improve programme performance, and to broaden impact. These changes emerged from formal and informal management and evaluation reviews and lesson learning within government; from concerns of and discussions with other stakeholders; and from changing policy concerns in a changing economic and political environment.

The major modifications in subsequent years are summarised in table 3. They concerned

- increasing volumes of subsidised fertiliser sales;
- increasing hybrid maize seed sales, the introduction of flexible vouchers for extra maize seed and legume seed (though legume seed supplies have been very limited), vouchers for grain storage chemicals, and cotton chemicals and seed;
- increasing reliance on private sector fertiliser imports to supply parastatal fertiliser sales, with improved tender procedures
- changes in the extent and modalities of private sector involvement in fertiliser sales, with a limited number of larger retail chains selling subsidised fertiliser in 2006/7 and 2007/8, a buy-back scheme to reduce government fertiliser stock holding risks, a premium in 2007/8to stimulate private retail network development in more remote areas, but for reasons which are debated exclusion of the private sector from subsidised fertiliser retail sales in 2008/9;

[8] The Starter Pack programme, as originally conceived, was not intended to be a social protection programme but to kick start agricultural development (see Levy, 2005, for a full discussion of the starter pack programme).

- changes in the extent and modalities of private sector involvement in seed sales, with all seed supplies from private seed supplies, and seed sales through a large variety of retail outlets including small agro-dealers, with variable seed pack sizes depending on seed costs;
- amendment of programme objectives and beneficiary targeting criteria and systems to give greater emphasis to concerns for vulnerable households, with increasing proportions of inputs for maize production and modified district / EPA allocation systems increasing allocations mainly in the southern region;
- introduction of beneficiary registration and more open and more tightly managed beneficiary selection, voucher distribution and market monitoring systems with less involvement of traditional authorities, more involvement of MoAFS staff and, in 2008/9, the use of open meetings for coupon allocation and distribution;
- from 2006/7 a fixed redemption price for all subsidised fertilisers, with the price falling and subsidy rising in subsequent years;
- funding of the seed component, of involvement of a specialist logistics unit, of independent evaluation, and of some other costs by donors;
- improved coupon design and printing security features.

Table 3: Principal changes in programme design and implementation, 2005/6 to 2008/9

	Subsidised inputs	Voucher distribution system	Voucher redemption systems	Other system innovations
2005/6	Maize & tobacco fertilisers, Maize seed (OPV)	District allocation by maize areas, distribution through TAs	Only through SFFRFM & ADMARC	
2006/7	Maize & tobacco fertilisers, Maize seed (hybrid & OPV)	District allocation by maize areas, distribution varied, through local government, TAs, VDCs, MoAFS	Fertilisers also through major retailers; flexible maize seed vouchers through wide range of seed retailers	Coupons specific to fertiliser type. Fertiliser buy back system. Involvement of logistics unit
2007/8	Maize & tobacco fertilisers, Maize seed (hybrid & OPV); legume seed (limited); cotton seed & chemicals	District allocation by farm hh & areas, distribution through MoAFS and VDCs	Fertilisers also through major retailers; flexible maize & legume seed vouchers through wide range of seed retailers; cotton inputs through ADDs	Reduced copies of coupons. Remote EPA premium. Fertiliser buy back system
2008/9	Maize, tobacco, tea & coffee fertilisers, Maize seed (hybrid & OPV); legume seed, cotton seed & chemicals, maize storage chemicals	District allocation by farm hh & areas; use of farm household register, open meetings for allocation & disbursement led by MoAFS	Fertilisers only through ADMARC & SFFRFM; flexible maize & seed vouchers through wide range of seed retailers; cotton inputs through ADDs	Extra coupon security features & market monitoring. No remote EPA premium. ADMARC computers for voucher processing

Sources: Logistics Units reports; 2005/6 (CISANet), 2006/7 (SOAS et al) and 2007/8 (MoAFS) evaluation reports; key informants; MoAFS Implementation guidelines.

Programme scale: The scale of the programme has grown each year, and it involves large scale, complex logistical and organisational challenges to tight deadlines. A highly simplified summary of the major tasks is shown in figure 2. It does not show the complex set of activities needed to complete each task, the scale of these tasks, or the interactions between different stakeholders. This involved in 2008/9 the selection from over 2.5 million farm households of more than 1.5 million fertiliser coupon beneficiaries, the printing and distribution of 5.9 million coupons, and purchase and distribution of over 3.4 million bags of fertiliser. All of this was done to tight deadlines, to widely dispersed farmers across the country (some in poorly accessible areas), with fraud and theft a major temptation and threat (the value of all subsidised commodities was approximately US$220 million, and of each fertiliser coupon was greater than 10% of annual household income for more than 40% of the population).

It is important to note that Malawi has implemented similar activities at varying scales since the introduction of the starter pack programme in 1998.

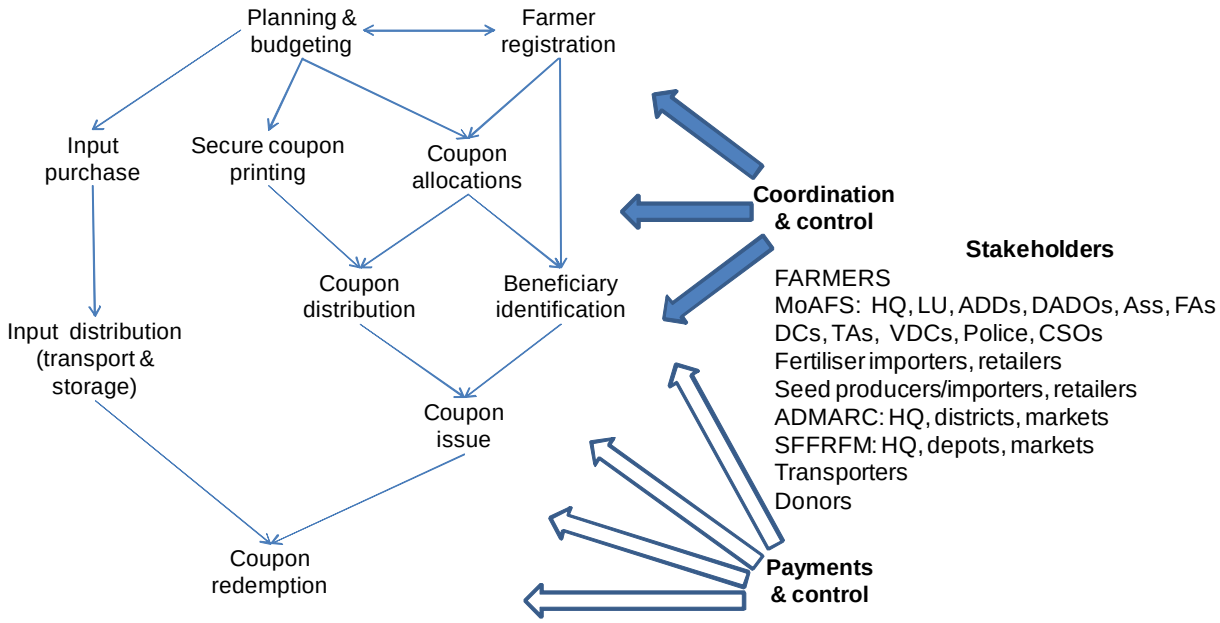

Figure 2. Major tasks in programme implementation

Implementation Performance: We consider the effectiveness and efficiency of implementation in terms of (a) disbursement volumes of subsidised inputs, (b) timing of subsidy sales and of supplier payments, (c) targeted beneficiaries' access to inputs, and (d) cost.

Table 4 Implementation performance indicators.

	2006/7		2007/8		2008/9	
Fertilisers						
Tender awards for parastatal supplies	late August		mid August		end July	
Depot receipts end Oct as % parastatal total sales		32%		58%		53%
Depot receipts end Nov as % parastatal total sales		77%		76%		71%
Outstanding payments end Nov (% & MK million)	28%	1,216	22%	1,595	16%	3,500
Outstanding payments end Dec (% & MK million)	46%	4,303	13%	1,192	13%	3,690
Outstanding payments end Jan (% & MK million)	14%	1,406	21%	2,620	n/a	7,707
Uplifts despatched end Nov % parastatal total sales		64%		70%		75%
Total relocation transport costs (MK million)		n/a		68.4		42.0
Finalisation of retail fertiliser contracts		early Nov		mid/late Nov		n/a
District voucher allocations		early Sept		9th Oct		12th Sept
Voucher printing		end Sept		end Oct	SR early Oct	CR/NR early Nov
Voucher & lists distribution to districts completed	7th November		3rd November		18th November	
Sales by end Nov as % total season sales		8%		n/a		30%
Sales by end Dec as % total season sales		74%		n/a		68%
SFFRFM/ADMARC voucher returns end Dec ('000)		0		101		175
SFFRFM/ADMARC voucher returns end Jan ('000)		111		720		1057
Finalisation of seed supply contracts		mid/late Nov		mid/late Nov		early Nov
Seed coupons in LU by end Dec % season sales		27%		4%		6%
Seed coupons in LU by end Jan % season sales		74%		18%		22%

Sources: Logistics Units reports; 2005/6 (CISANet), 2006/7 (SOAS et al) and 2007/8 (MoAFS) evaluation reports; key informants

As discussed earlier, ***volumes of subsidised inputs*** have increased steadily from year to year. Rising disbursement targets were exceeded in 2006/7, 2007/8, and 2008/9 by 16%, 27% and 19% respectively. Although this shows success in meeting demand, it also shows difficulties in controlling disbursements and costs – but this was not the case in 2009/10.

Timing of subsidy sales depends on the timing of input availability in markets and on timing of voucher issues to beneficiaries and is critical for the effective gains from seed and fertiliser use. Information on timing of fertiliser tender awards, fertiliser deliveries, payments, retail contracts, voucher allocation and distribution, and seed and fertiliser sales is given in table 4. There are general improvements in performance as regards award of seed and fertiliser contracts and fertiliser deliveries to depots and markets. Information on fertiliser sales timing is incomplete

As regards ***targeted beneficiary access*** to inputs, information on coupon allocation and issues and beneficiaries' use of coupons is only available from household surveys and focus group discussions and household surveys examining the 2006/7 and 2008/9 programmes. These suggest

- 65% of farm households received one or more fertiliser coupons in 2008/9, with an average of 1.5 coupons per household receiving coupons and of 1.1 coupons per household across all households. (for 2006/7 equivalent figures were 54%, 1.7 and 1.0.)
- variable targeting criteria across years and different areas[9];
- targeting of households which are productive full time farmers but disproportionate subsidy receipt by male headed households with more land and other assets;
- modification of coupon allocations in some areas (particularly the south and centre) so that many households (40% in these regions in 2008/9) received one fertiliser coupon (rather than fewer receiving two);
- widespread open meetings for coupon allocation in 2008/9 increasing the proportion of coupons and subsidised fertiliser going to poorer households (Chirwa et al, 2010);
- under-estimates by key informants of the proportion of households receiving subsidised inputs as compared with information from the household survey;
- Large numbers (75% or more) of parastatal and private suppliers suffering from frequent major queues;
- 5% of households reporting that some payments were required to receive coupons (with median prices of MK1000 and MK2,000 in 2006/7 and 2008/9 respectively);
- 15% or more of fertiliser coupons requiring payment of a 'tip' for redemption, leading to median total redemption costs of MK1000 per bag in both 2006/7 and 2008/9.

Fraud may arise through voucher allocation to non-existent ('ghost')beneficiaries (or villages), diversion to others (government staff, traditional leaders or politicians), direct allocation to people who do not satisfy beneficiary criteria, and printing of extra or counterfeit vouchers. Determination of the extent of such fraud is very difficult, due to the absence of transparent and formal audit systems for the whole programme, and to discrepancies between NSO and MoAFS estimates of the total farm families in Malawi (with MoAFS estimates 30% or more above NSO estimates). SOAS et al (2008) considered that there was insufficient evidence to suggest that widespread fraud was going on, and that household survey estimates of subsidised fertiliser access was broadly compatible with the MoAFS farm household estimates. Each year there are press and anecdotal reports of fraud. Dorward et al (2010b) suggest that NSO estimates (NSO, 2009a) may underestimate the number of farm families in Malawi, but it is unlikely that they underestimate numbers by a third. In 2008/9 a major security breach in the printing of vouchers led to reprinting of more secure vouchers for issue in two regions.

Programme costs from 2006/7 to 2008/9 were over budget and increasing due to growing subsidy volumes and large rises in fertiliser prices, but this trend was dramatically reversed in 2009/10. At their peak in 2008/09, subsidy costs accounted for 80% of the public budget to agriculture and 16% of the total national budget. Table 5 shows estimates of per unit fertiliser costs and total programme costs. Both fertiliser prices and transport costs rose from 2005/6 to 2008/9 with per unit cost increases in line with international price

[9] These variations in targeting are due to (a) vagueness in the definition of target beneficiaries in the guidelines and (b) differences in the way communities dealt with problems of shortages. These meant that those that were targeting beneficiaries placed different emphasis on different criteria and processes.

increases over the same period. Rising costs were met by increasing budgetary allocations to the Ministry of Agriculture and Food Security without any cuts in budgetary allocations to other activities, but there are important questions about possible benefits foregone from alternative investments that could have been made with those funds. The programme also consumes very substantial staff time and other resources, diverting these from other activities in the critical time before and at the start of the cropping season. This use of staff time and resources poses severe challenges to other essential research and extension activities of the Ministry even if the dramatic reduction in financial costs in 2009/10 is maintained in future.

Table 5. Fertiliser and Programme Costs

	2005/6		2006/7		2007/8		2008/9		2009/10
	planned	actual	planned	actual	planned	actual	planned	actual	actual
Fertiliser costs (US$/mt):									
Parastatal: Total		393		490		600		1,250	614
Private retailers: Total		n/a		490		612		n/a	n/a
All suppliers		393		490		590		1,250	614
Programme costs:									
Malawi Government	36.4	51.4	51.4	81.4	73.6	109.6	127.0	227.8	101.1
Donors (US$ mill)			12.5	9.5	5.7	7.1	12.1	37.8	20.2
Total (US$ mill)	36.4	51.4	53.6	90.9	82.1	116.8	139.1	265.4	121.3
Net of farmer payments		32.0		73.9		95.4		242.3	109.9
Total as % MoAFS budget	n/a	n/a	43%	61%	51%	61%	61%	74%	n/a
Total as % national budget	4.3%	5.6%	5.4%	8.4%	6.7%	8.9%	8.5%	16.2%	n/a
Total as % GDP		2.1%		3.1%		3.4%		6.6%	n/a

* excluding costs of buy back brought forward.
** including costs of buy back brought forward.
2005/6 fertiliser costs may also include some seed & coupon production/ distribution costs. Parastatal transport etc costs exclude ADMARC overheads
Sources: Logistics Units reports; 2005/6 (CISANet), 2006/7 (SOAS et al) and 2007/8 (MoAFS) evaluation reports; GoM budget statistics; Dorward et al (2010a, 2010b).

The Agricultural Input Subsidy Programme: Outcomes and Impacts

The major stated objectives of the subsidy have been to achieve food self-sufficiency and increased income of resource poor households through increased food and cash crop production. Increased production is therefore critical to achievement of programme objectives and itself results from incremental use of inputs (mainly fertilisers and seeds) leading to increased yields, with yield responses to these inputs depending upon the weather and the efficiency of input use and of crop production. Other, complementary, potential outcomes and objectives of the programme are development of more effective and efficient input supply systems, poverty reduction, and economic growth. An important distinction needs to be made here between direct impacts on subsidy recipients and wider, indirect impacts of the programme that, as result of its impacts on market prices (principally for maize and labour), affect everyone irrespective of their receipt or non receipts of subsidised inputs. These arise because of the very large scale of the programme and are traced out in figure 3. Achievements in each of these spheres needs to be considered in terms of effectiveness, efficiency and sustainability, and there are major difficulties here in comparing programme outcomes against possible alternative ways of achieving the same outcomes.

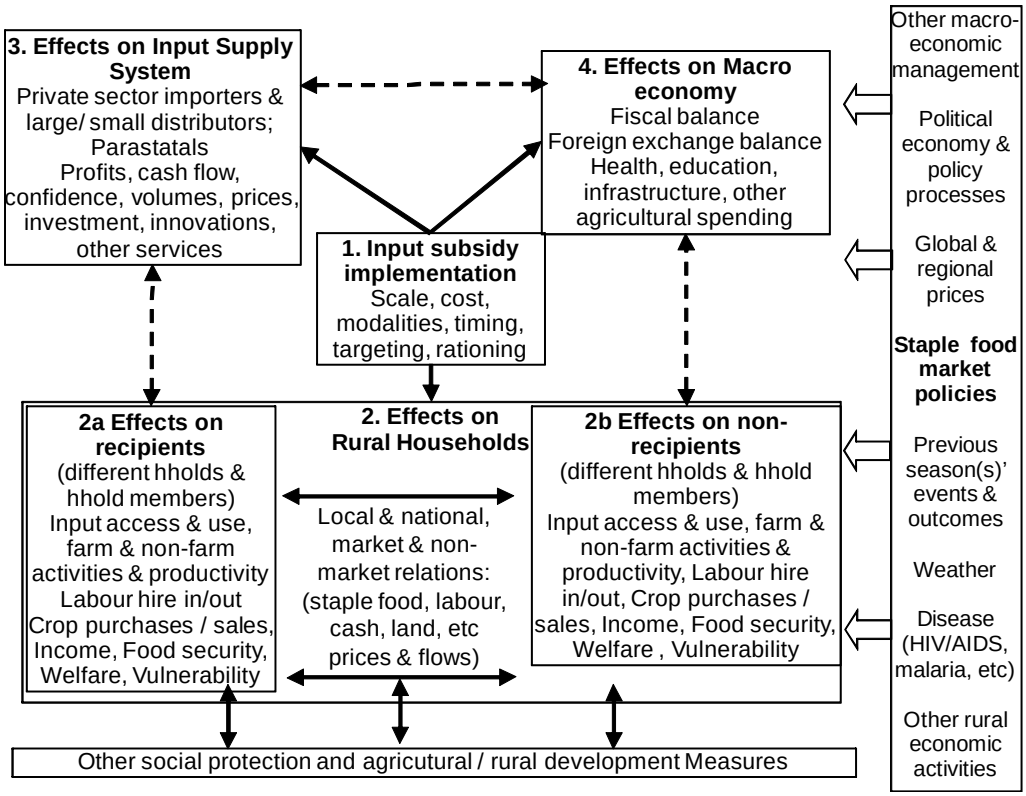

Figure 3 Direct and indirect subsidy impacts

(adapted from SOAS et al, 2008)

Incremental input sales and use determine the incremental production resulting from the programme and depend upon the volume of subsidised input sales and the extent to which these sales displace unsubsidised commercial sales, when a farmer receiving subsidised inputs reduces commercial input purchases which they would otherwise have bought if the subsidy had not been available.

Displacement is difficult to estimate as farmers change their commercial purchases from year to year as output prices, input prices and access to seasonal finance change. SOAS et al (2008) examined changes in aggregate sales to estimate fertiliser displacement in 2005/6 and 2006/7 as 20% to 30% and 30% to 40%, respectively (with higher displacement for tobacco fertilisers and lower displacement for maize fertilisers). Ricker-Gilbert et al (2009) estimated a displacement rate of 29% using panel data of farmer purchases in 2006/7 (some further displacement would arise for any subsidised fertilisers not received by smallholders), and found greater displacement rates among less poor subsidy recipients, and lower displacement among poorer recipients. 2007/8 is expected to have had similar displacement to 2006/7 while much lower displacement is estimated for 2008/9 (Ricker-Gilbert and Jayne, 2010) as a result of much higher fertiliser prices, and earlier (separate) beneficiary registration and some improvements in targeting (which may be associated with a greater proportion of recipients in the Southern Region). Displacement of maize seed sales appears to be much lower, with strong growth in commercial seed sales in 2006/7 (Kelly et al, 2010).

Incremental production depends on incremental input use and on the yield impacts of this input use, which in turn depends upon rainfall, crop variety/ fertiliser / soil fertility interactions, and crop management (including timing and methods of planting, weeding, and fertiliser application). Indications and estimates of the subsidy's production impacts can be gathered in three ways: from estimates of crop responses to incremental input use, from estimates of total national maize production, and from consideration of changes in maize prices.

There are substantial difficulties in obtaining precise measurements of crop responses to incremental input use and these make it very difficult to estimate incremental production, but a broad range of 12 to 18 kg grain per kg of N with 15 a reasonable 'medium expectation' is supported by both wider secondary sources and farm survey results (SOAS et al (2008) and Dorward and Chirwa (2010)). Table 6 sets out estimates of annual

incremental production depending on incremental fertiliser and seed sales and changes in grain to nitrogen response ratio reflecting different conditions in different years [10].

Table 6 Estimated incremental fertiliser sales, maize supplies & prices, 2005/6 - 2008/9

		2005/6	2006/7	2007/8	2008/9
Incremental fertiliser sales as % of subsidy sales		70-80%	60-70%	60-70%	90%
Incremental fertiliser use (MT)		98,541	113,547	140,760	181,800
Incremental seed use (MT)	OPV	3,000	1,764	2,604	833
	Hybrid	0	2,760	2,937	4,532
Yield response as % 2008/9 estimate		80%	100%	70%	100%
Subsidy programme incremental maize production estimates (MT)	Total 'medium' estimate	406,348	647,474	566,235	968,900
	above 2002/3 & 2003/4	273,609	514,735	433,496	836,161
	High estimate: +20%	487,618	776,969	679,482	1,162,800
	above 2002/3 & 2003/4	328,332	617,683	520,196	1,003,514
	Low estimate: -20%	325,078	517,979	452,988	775,200
	above 2002/3 & 2003/4	218,887	411,788	346,797	669,009
National crop production estimates	increment above 2002/3 & 2003/4 (MT)	975,262	1,698,956	1,031,938	2,031,816
Net maize exports (following year exports - imports) (MT)		-78,491	224,972	-101,027	-50,398

Note: Incremental fertiliser and seed sales from Dorward and Chirwa (2009). Grain to N response and increment seed impact for 2008/9 from Dorward and Chirwa (2010). 2005/6 OPV sales estimated as 50% of budgeted sales. National crop estimates from MoAFS. Net maize exports from Jayne et al (2010). 2002/3 and 2003/4 production seasons are taken as two non-drought years for pre-subsidy comparisons, though targeted input subsidies of 35,000 and 22,000 MT of fertiliser were provided in these years. 10% displacement assumed for these years.

A number of important points should be noted from the incremental maize production estimates in table 6:

a. Incremental production is highly sensitive to yield responses to inputs – so that good subsidy programme and crop management is critical for raising yields and yield responses through, for example, early subsidy sales, planting and fertiliser application, high plant populations, and greater use of organic matter.
b. Higher fertiliser response by hybrid seed is not explicitly shown in table 6 but this means that increasing subsidised or unsubsidised sales of hybrid maize seed is another important way to increase the subsidy's production impacts.
c. Incremental production estimates are very large, and have grown over the programme with increasing volumes of incremental fertiliser and hybrid seed use.

The increases estimated from yield response rates to incremental input use are, however, considerably lower than those in the widely cited national crop estimates for maize production, and show much lower variation[11]. Changes in maize prices between years also suggest that the supply of maize following each subsidy year was lower than that suggested by the national crop estimates. Figure 4 plots per capita maize supply estimates (Ministry of Agriculture and Food Security 'crop estimates' of production plus net imports divided by estimated national population) against maximum monthly prices in Lilongwe in 1990US$ for the following season, distinguishing between two different time periods. From the 1994/5 to 2005/6 production seasons there is a roughly downward sloping relationship with high maximum prices following years of low production, and low prices following years of high production. The three later subsidy seasons do not however fit into this pattern, showing high prices despite very high estimates of production. However, these high prices did not

[10] This calculation only considers impacts on maize production. It ignores fertiliser impacts on crops mixed with maize and on tobacco – the latter assumption is not unreasonable as there is much higher displacement with fertiliser subsidy for tobacco.

[11] National crop estimates for 2005/6 were 933,000 MT higher than the average for the previous 8 seasons, which included seasons with both good and poor rainfall with on average 38,000MT of subsidised fertiliser distributed each year (SOAS et al, 2008).

lead to any reports of widespread suffering and distress such as experienced in previous years with equivalent high prices (for example following the poor 2000/1 and 2004/5 harvests).

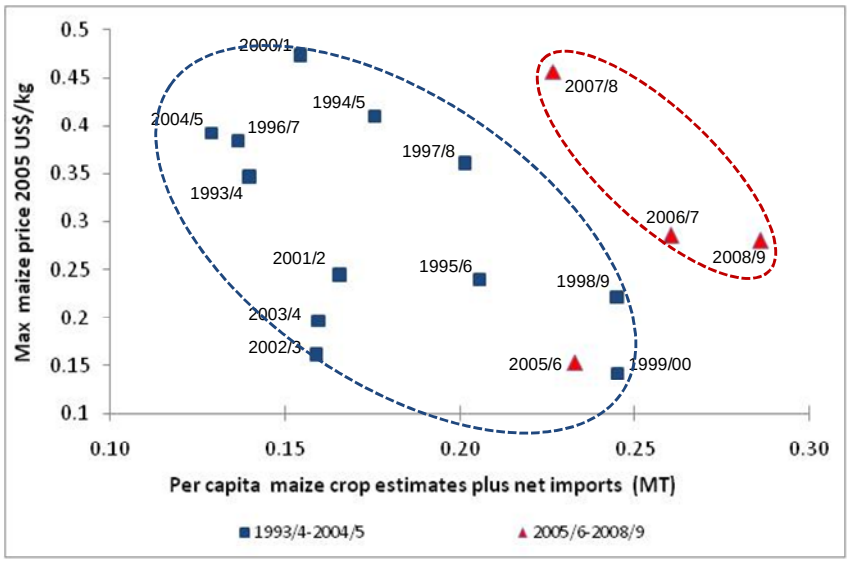

Figure 4 Maximum monthly maize prices by estimated maize supply by season

Note: Estimated maize supply = crop estimate plus exports – imports.

A number of explanations are put forward for this apparent discrepancy[12]:

- Increases in real incomes, falling poverty rates and increasing population may raise national demand, causing the 1995/96 to 2004/5 pattern to drift to the right over time –this does not explain dramatic shift from 2006/7 nor the differences between these later subsidy years, but is compatible with the lack of distress in later years despite high prices.
- Storage losses may be increasing as a result of increasing cultivation of hybrid maize in the later subsidy programme years – but in the 2009 household survey 50% of respondents reported no storage losses in the 2007/8 and 2008/9 storage years, and only a little over 20% reported high losses; Mangisoni (2010) also reports relatively low losses.
- Higher welfare and real incomes following the 2005/6 harvest and low maize prices could have led to more retention and consumption of the 2006/7 harvest and a tighter, thinner market.
- Over-estimates of national maize production following the implementation of the subsidy programme with bias arising from field workers' subjective estimates of crop area and yield being affected by involvement of field workers in the subsidy programme.

Increased food self-sufficiency may arise at national or household level, and is not the same as increased food security, which may also arise at national or household level. Table 6 shows estimated net maize exports (imports) over the four years of the subsidy programme. Average estimated net imports over the four marketing seasons following subsidies in 2005/6 to 2008/9 amount to just over 1,000 MT, compared with nearly 132,000MT over the previous 8 seasons. However, those seasons included some years with very high imports (more than 289,000MT) due to poor rainfall and low and poor input use. If these seasons are excluded then average net imports in previous years amount to a little over 21,000MT. This suggests that the programme has substantially improved national food self sufficiency. Estimates of incremental maize production (discussed earlier) support this, and, together with results from focus group discussions with farm households in 2007 and 2009, suggest that household food self sufficiency has also improved for those households in receipt of subsidised inputs. However, disproportionate subsidy receipt by male headed households with more land and other assets (noted earlier) means that many households who are not food

[12] Higher world prices are unlikely to have affected local prices very much due to the high transport costs and wide band between import and export parity prices.

self sufficient will not have benefited directly from incremental production from subsidised input use – although again as noted earlier there have been some improvements in targeting from 2006/7 to 2008/9.

Food security is related not only to the availability of food (related to self sufficiency) but also to access, which for many people is determined significantly by food prices. Figure 4 presents information on maximum monthly prices before and during the subsidy programme. Mean prices in the 8 marketing seasons prior to the subsidy programme were 0.18 US$/kg (current US$) which are lower than the mean of 0.25 US$/kg for marketing seasons following subsidy implementation. Similarly, maximum monthly prices in earlier seasons are lower than those for marketing seasons following subsidy implementation (0.25 compared with 0.32 US$/kg). The apparent decline in food security indicated by these figures needs to be set against greater availability of maize in villages (reported by focus group discussions), lack of evidence of widespread food shortages that accompanied high prices in previous years, and significant rising nominal wage rates from 2005/6, which appear to have been greater than maize prices rises in 2006/7 and to have roughly matched maize price increases over the 2005/6 to 2008/9 period (Dorward et al, 2010a). Household survey reports on food security do not show any clear trends in improvement: in 2004, prior to the subsidy, 57% reported inadequate food consumption over the previous 12 months (NSO, 2005), this figure then fell to 50% in 2007 but rose again to 56% in 2009 (SOAS et al, 2008; Dorward et al, 2010a).

The extent to which the subsidy programme has **increased incomes** depends upon the interactive effects of transfer gains for subsidy recipients (where recipients sell coupons or inputs, or the subsidy displaces unsubsidised input purchases), incremental production from incremental input use, and prices determining the value of incremental production. High maize prices lead to a high valuation of incremental production (if these high maize prices were not in some way caused by the subsidy programme). The extent of these effects and their distribution determines the **poverty reduction** impacts of the programme. There is evidence that poverty incidence has fallen in Malawi from 52% in 2004/5 to 40% in 2007/8 and 2008/9 (NSO 2006, 2009b). It is not possible to directly attribute this to the subsidy programme (other contributors include high tobacco prices, macro-economic stabilisation with low interest rates and inflation, and good weather). However, 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).

The earlier discussion of the low maize productivity trap suggests that sustained increases in maize productivity and in real incomes with falling real food prices should provide important pre-conditions for **economic growth** processes and diversification out of maize. The extent to which these conditions have in fact occurred is debatable, in view of the high maize prices experienced in recent years. Nevertheless there should be some contributions to economic growth, but it is not possible to quantify them. However, very large increases in national maize production reported by the MoAFS crop estimates are an important component of higher GDP growth rates reported for Malawi. Estimates of incremental production discussed earlier suggest that the subsidy programme has made a substantial contribution to part of these estimated increases in national maize production.

It is also difficult to determine the extent to which the programme has contributed to the development of **improved input supply systems.** Impacts have to be considered separately for fertiliser importers, fertiliser retailers, seed suppliers, and seed retailers (both small independent agro-dealers on the one hand and retail outlets of larger companies).

Private sector fertiliser importers have benefited from supplying increasing volumes of government subsidy sales, rising from 70,000MT to 162,000MT, though they have faced some difficulties from exposure to foreign exchange losses with delays in payments in Malawi Kwacha. Maize seed suppliers have also benefited from significant growth in sales over the life of the programme.

With regard to retail sales, we consider four processes by which the programme differentially affects participating and excluded retail outlets' sales:

- direct losses from displacement[13] of commercial sales by subsidy sales (harms all retail outlets);

[13] Displacement of commercial sales occurs where a farmer reduces his or her unsubsidised input purchases as a result of their being able to buy the same or a similar input under the subsidy programme.

- direct gains from sales of subsidised inputs (benefits participating outlets);
- associated gains or losses from customers buying unsubsidised items while buying subsidised inputs (benefits participating outlets and harms excluded outlets); and
- indirect gains from general increases in demand if the programme stimulates wider income growth and easing of liquidity constraints from one season to another (benefits all retail outlets).

Input suppliers are very concerned about losses of fertiliser sales due to displacement if these are not counteracted by gains in subsidised sales and customers from participation in the subsidy scheme. As noted earlier, fertiliser displacement rates of 20% to 40% (ie 20 to 40% of subsidised sales replace unsubsidised sales) were estimated for the 2005/6 and 2006/7 seasons from examination of changes in aggregate sales SOAS et al (2008) and from panel data analysis of farmer purchases (Ricker-Gilbert et al, 2009). Similar rates may be expected for 2007/8 while a lower displacement rate of 2% is estimated among households for 2008/9 (Ricjer-Gilbert and Jayne, 2010) as a result of high fertiliser prices and greater allocations of subsidised fertiliser to the South, although possible leakage and diversion is likely to lead to a higher rate of displacement across the programme as a whole). Displacement of maize seed sales appears to be much lower, with strong growth in commercial seed sales in 2006/7 sustained in subsequent years (Kelly et al, 2010).

Losses from displacement may be reinforced or counteracted by the impacts of participation or exclusion in the programme on subsidy sales and on customers visiting different retail outlets. Small agro-dealers have been excluded from retail sales of fertiliser subsidies in all four years of the programme, but a number have, with larger companies with retail outlets, been able to sell subsidised maize seed from 2006/7 onwards. Some larger companies with retail outlets were also able to sell subsidised fertilisers in 2006/7 and 2007/8, but were excluded in 2008/9. Participating retail outlets reported significant increase in unsubsidised sales in 2006/7 but private retailers' exclusion from fertiliser sales in 2008/9 led to falls in reported unsubsidised fertiliser sales (Kelly et al, 2010).

The Agricultural Input Subsidy Programme: effectiveness, efficiency and sustainability

The effectiveness of the input subsidy programme in delivering outcomes and impacts has been discussed above. Questions about efficiency, however, ask if these outcomes and impacts could have been delivered at lower cost, either by other means or by improving the design and implementation of the programme.

Efficiency is commonly measured in economic terms using cost benefit analysis. Economic returns to the programme largely depend upon the price of inputs, the economic price of maize, and production responses to increased input use. As noted earlier there are substantial difficulties in estimating (a) yield responses to incremental input use and (b) the economic value of incremental maize production. SOAS et al (2008) show that benefit: cost ratios for the 2006/7 programme could, with reasonable variation in assumptions, range from 0.76 to 1.36, with a mid estimate of 1.06. Subsequent adjustments to this analysis using estimated maize and fertiliser prices for other years suggest that the programme should have yielded equivalent or higher returns in both 2005/6 and 2007/8. However, very high fertiliser prices when fertilisers were being purchased for the 2008/9 programme depressed returns in 2008/9, despite good weather and yields and higher maize prices (although these did offset the effects of high fertiliser prices to some extent). Estimates of fiscal efficiency (net economic benefit per unit fiscal investment) show a similar pattern to economic returns, but in addition these are (negatively) affected by high rates of displacement of unsubsidised sales by subsidised sales (as displacement lowers the net benefit of subsidised sales).

Key conclusions from this analysis are that

(a) the yield response to fertiliser is a critical determinant of economic returns,

(b) displacement rates are a critical determinant, and

(c) the programme can yield high returns with good programme implementation and good (but achievable) yield responses to fertiliser.

We discuss below how programme design and implementation can improve economic returns and consider here if programme outcomes can be achieved more efficiently by other means. If programme design and implementation cannot deliver low displacement and high yield responses to subsidised inputs, then economic cost benefit analysis suggests that alternative types of investment, for example in research and extension and in rural roads, have yielded high returns in poor agrarian economies in the past (see for example Fan et al, 2004; Fan et al., 2007; Economist Intelligence Unit, 2008).

There are, however, a number of difficulties in choosing between these different types of investment using simple comparison of rates of return. In particular:

- Simple cost benefit analysis of the input subsidy programme does not take account of important dynamic and distributional aspects of the programme – for example high maize prices yield higher estimated rates of return but, as argued earlier, the programme will yield higher growth benefits if it can lower domestic maize prices,
- If the subsidy programme yields benefits then these are very immediate (within 2 years) as compared with much longer pay back periods for most other investments – but social discount rates are affected by wealth and hence are endogenous, so that an investment yielding a low but rapid return may be preferred to one that yields a higher return over a longer period. They are also affected by failures in financial markets.
- There are strong complementarities between the main alternative ways of increasing agricultural productivity, in that high yield responses to inputs require research and extension not only into external input use but also into complementary soil fertility management methods. Rates of return on different investments are affected by these complementarities, and also by increasing and decreasing returns to scale and by the efficiency with which they are implemented. It may be best therefore not to look for the most efficient alternative investments, but for the most efficient alternative combinations or packages of investments

These considerations are closely related to considerations of **sustainability**. Fundamental questions here concern the desirability of sustaining the programme, and its economic, political and agro-ecological sustainability.

As regards *desirability of sustaining the programme*, there is a common perception among economic policy analysts that where subsidy programmes are needed then they should play a very short term role in acquainting farmers with the benefits and methods of adopting a new technology and perhaps of kick starting input markets (see for example Morris *et al*, 2007). It has, however, been argued in this paper that the Malawi Agricultural Input Subsidy Programme is addressing longer term problems of input affordability and lock-in to low productivity maize cultivation that stifle diversification out of maize and the development of the non-farm economy. This cannot be achieved by a short term investment, but require sustained and consistent investment over many years. However, such sustained and consistent investment needs to be effective, efficient, and sustainable.

Economic sustainability requires constant striving for effective and efficient packages of complementary investments as discussed earlier. This needs constant change to match changing circumstances and changing demands made of the programme. The programme must also be affordable. Problems of crowding out of competing and complementary investments were discussed earlier as they arise within the MoAFS and the national budget, and these have been a subject of common criticisms of the MAISP, that it is not sustainable macro-economically.

There is no doubt that the programme does have macroeconomic impacts. Beneficial impacts arise from the impacts of substantial increases in productivity of large amount of land and labour employed in maize production by beneficiary households, with consequent impacts on GDP growth. However, very large programme costs have potential negative impacts. Costs increased from a little under 6% of total government expenditure in 2005/06 to more than 16% in 2008/9. Over the same period subsidy programme costs rose from 2.1% of GDP to 6.6%. This dramatic increase in costs was the result of increases in the subsidised input volumes and, most importantly, a tripling of fertiliser prices. These prices fell back dramatically in the 2009/10 programme, as did government intentions for and implementation of the scale of the programme.

In its first two years there was no evidence of the subsidy having negative macroeconomic impacts (SOAS et al, 2008), as a result of sound macro-economic management, budgetary support from donors, improving macro-economic indicators (growth, inflation and government deficit) and wider growth in the economy (Reserve Bank of Malawi, Financial and Economic Review 2009*)* – with the subsidy itself being a contributor to that growth. Higher programme costs in 2007/8 and particularly 2008/9 combined with a number of internal and external macro-economic pressures to cause adverse changes in macro-economic indicators. This and the very high budgetary and foreign exchange allocations to the subsidy programme then reduced funding available to other activities such as health, education and infrastructural development (Dorward et al, 2010a).

It has been clear that the 2008/9 level of spending is not sustainable. Although the very high fertiliser prices in the 2008/9 season were a temporary phenomenon, government has committed itself to controlling costs by limiting the volume of subsidised fertilisers in future years. It is also restricting the subsidy to inputs for maize , and in 2009/10 actual fertiliser subsidised was only just over the 160,000 MT budgeted. The difficulties posed by higher fertiliser prices are, however, instructive of the dangers posed by high fertiliser prices - and with higher energy prices and carbon taxes likely in the future, fertiliser prices can be expected to rise again. This poses challenges to the affordability and economic benefits of the programme. However, international food prices are also likely to rise, increasing the programme's economic, political and welfare benefits. High fertiliser prices also increase the need for the programme in overcoming (particularly poorer) farmers' affordability problems in accessing fertilisers, again increasing the programme's economic, political and welfare benefits. The likelihood of higher fertiliser prices in the future therefore increases the need for measures that raise the efficiency of the programme. These include reducing displacement, improving targeting, controlling fraud and costs, achieving an optimal scale of investment in the programme and in complementary investment (in research, extension, and roads), realising efficiencies and capital savings from greater private sector involvement in input distribution, and raising the agronomic efficiency of subsidised input use (which we discuss below).

However, the dilemmas that arise with higher fertiliser prices (of higher and less affordable costs but greater benefits) and the implementation of many of these efficiency measures also have significant implications for the political and agro-ecological sustainability of the programme.

The government faces difficult political choices which affect the programme's *political sustainability*. The programme was an important and high profile contributor to the President's and his Democratic Progressive Party's (DPP) success in 2009 presidential and parliamentary elections. Political pressures to expand the programme and to use it for patronage were evident in the run up to the election. International experience shows that these pressures are widespread and are likely to grow as the programme becomes an entrenched part of the political and economic system (see for example Dorward, 2009). These, however, must be contained and expenditures controlled in order to allow good macro economic management and to release funds for other core investments and activities. The availability of budgetary resources and foreign exchange from aid and from mineral earnings may be very important in determining the options open to politicians and government. Considerable political and policy skills are needed to chart a course that balances short term political and longer term economic concerns in the context of different regional interests, declining relative importance of rural as compared with urban populations, and changing political concerns and economic and welfare relations between food and non-food expenditures and farm and non farm employment.

Finally, we consider the *agroecological sustainability* of the programme. On one hand, there are widespread concerns about increased inorganic fertiliser use impacts on water courses and on soil fauna and soil health. The manufacture of inorganic nitrogenous fertilisers also involves large energy inputs and hence CO_2 emissions. Use of nitrogen fertilisers also leads to release of nitrous oxide (N_2O) from the soil, a very potent greenhouse gas. On the other hand, continual cultivation of soils without fertilisation leads to loss of soil structure and erosion, and low yields lead to continuous cultivation and its extension onto steeper slopes and into forest areas. It is therefore important to try to raise soil fertility with reduced and more effective use of inorganic fertiliser. This can be achieved by greater use of organic fertilisers (for example in association with reduced or no-till practices as in 'conservation agriculture') and better placement, timing and formulation of fertilisers in an integrated soil fertility management (ISFM) approach. This should not only reduce the negative effects of inorganic fertiliser use described above, but provide tangible benefits in terms of reduced input costs and increased efficiency, improving the economic and political sustainability of the programme. The record of promotion of more use of organic fertilisers in Malawi is, however, mixed. While there are notable examples of specific successes, these have generally been on a small scale and have not been widely taken up (see for example Munthali, 2007). It is therefore important to consider how to promote more widespread and effective use of ISFM as an integral part of the subsidy programme. This has been addressed mainly by including the provision of subsidised legume seeds in the programme, but this has not been a major focus in the programme, and the supply of these seeds has been very limited (Dorward et al, 2010b), although subsidised legume seed sales rose from almost zero in 2008/9 to over 1,500 MT in 2009/10. While current efforts can be extended, more investment in research is needed, together with investigation of possible ways of linking adoption of ISFM practices to access to subsidised inputs (SOAS et al, 2008).

There are also concerns about the agro-ecological sustainability of cropping systems that are dominated by maize and by increasing use of hybrid maize. These are complex and debated issues, related to genetic

diversity, threats of climate change, and relative benefits and trade-offs in increasing productivity and resilience. They need to be considered in the context of the effects of the current emphasis on maize productivity on the extent of maize cultivation (many argue that it promotes maize cultivation but it is argued in this paper that it can also reduce reliance on maize and 2008/9 evaluation survey evidence suggests that maize areas have stayed roughly constant while Holden and Lunduka (2010) suggest that it has declined).

Lessons from the Malawi Agricultural Input Subsidy Programme

Two sets of closely related lessons for other countries can be drawn from our analysis of Malawi's recent agricultural subsidy experience. We first consider the potential benefits that subsidy programmes can yield, and the circumstances under which those potential benefits are important. We then discuss key issues for the design and implementation of large scale subsidy programmes to deliver those potential benefits. Full discussion of these issues in the context of a detailed theoretical consideration of agricultural input subsidy programmes can be found in Dorward (2009).

Subsidies are too often income transfers from the state to less poor farmers, yielding very low economic and fiscal returns to government investments. The core thesis set out in the early part of this paper is that Malawi's agricultural input subsidy programme addresses a low maize productivity trap that leads to food insecurity and poverty, and constrains economic growth and, paradoxically, diversification out of maize and agriculture. This low productivity trap arises as a result of severe seasonal credit constraints affecting very large numbers of poor, food deficit farming families, together with thin and high risk, high margin input and maize markets. The key successes of Malawi's subsidy programme arise where it relieves both affordability and profitability constraints to increased staple crop productivity from increased input use, and in doing this both raises land and labour productivity and improves food security for large numbers of poor households through some combination of increased real wages and reduced food prices. This model of success will only potentially apply to other countries where large numbers of people face similar staple food productivity constraints and where substantial potential increases in productivity from increased input use are similarly constrained by thin input markets, poorly developed input supply systems, and widespread profitability and affordability problems.

For a large scale subsidy programme to realise its potential benefits, its design and implementation need to be effective, efficient and sustainable. The following key and often inter-related issues in this have been highlighted in or emerge from discussion earlier in the paper:

- *Focus*: subsidies need to be focussed on inputs for important staple crops with a high potential response to input use which is constrained by the market, profitability and affordability conditions discussed above and with emphasis on both consumer and producer gains.
- *Scale*: sufficient local or national scale is needed for the subsidy to affect staple crop prices and/or labour markets, but scale also needs to be limited in order to control programme costs to ensure that the programme is affordable and efficient, funds limited displacement, and does not crowd out critical complementary investments
- *Effective targeting and rationing systems* are needed to control costs, reduce displacement and increase effective use of subsidies in generating incremental production and land and labour productivity. Targeting may be geographical (eg by agro-ecological region or livelihood zone) or by household – these approaches have different costs, and practical and political feasibilities (see Dorward 2009 for further discussion), and universal provision, with strict rationing, may be the best practicable, effective and efficient approach (see for example SOAS et al, 2008).
- *Entitlement systems* need to be robust for effective targeting and rationing. Strenuous efforts are needed to ensure that paper vouchers are secure against counterfeiting and diversion. Smart cards and other electronic systems linked to debit cards and/or mobile phone based financial transfer systems are becoming increasingly practical and have many potential advantages but side effects of their implementation needs to be carefully considered.
- *Logistical systems* face major challenges in coordinating targeting, entitlement, input distribution and purchases for timely, low cost and easily accessed delivery of small quantities of subsidised inputs to large numbers of dispersed farmers. Major investments are needed in the building of human and physical capacity for the efficient and effective development and operation of these systems.
- *Input supply system development* should be a major outcome from agricultural input subsidy programmes, and this requires close attention to the complementary and changing roles of different public sector and commercial stakeholders, and institutions and fora that foster the development of

trust and transparent and stable medium to long term policies that encourage increasing private sector investments and activities.

- *Performance monitoring, information and audit systems* are essential for developing trust, controlling fraud, and establishing clear incentives for effective and sustainable engagement by public sector, commercial, civil society and political stakeholders. Malawi's experience demonstrates the importance of reliable information not just on specific matters concerned with the implementation of the programme but also on much larger issues such as national population and production statistics.
- *Complementary policies and investments*: the productivity, market and economic impacts of a large scale subsidy programme are highly dependent on a range of complementary investments and policies promoting infrastructure development, staple market development and stability, integrated soil fertility management and improvement, agricultural research and extension, and economic diversification in rural areas.
- *Macroeconomic management* that promotes a good investment climate, favourable conditions for growth, and budgetary resources to support the programme
- *Political commitment* is essential for sustained mobilisation of the very substantial resources required for the implementation of a large scale subsidy programme in poor countries with a limited tax base where such programmes have the most potential. There may, however, be potential conflicts between the need for patronage to garner broad based and sustained political support on the one hand and on the other the targeting, rationing, cost control, auditing, and needed for such programmes to be economically efficient and sustainable.
- *Stability, flexibility and innovation* are all needed – stability to provide stakeholders with the confidence and security (to justify long term financial and other investments associated with the programme's implementation and realisation of long term objectives); flexibility to adjust to changing conditions (for example in international and national markets, in rainfall, in politics, in the national economy) with some of these changes the direct or indirect and anticipated or unanticipated result of the programme; and innovation (in systems, in technology, in prices) to take advantage of learning and change during programme implementation. However, flexibility and innovation can undermine stability, and to avoid this there must be stable principles that govern both the long term objectives of and relations between different stakeholders on the one hand and processes for learning, flexibility and innovation on the other.

Glossary and Acronyms

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
CAN	Calcium Ammonium Nitrate
CNFA	Citizens Network for Foreign AffairsCPI Consumer Price Index
DfID	Department for International Development
Dimba	Wetland cultivated in the dry season
EPA	Extension Planning Area
EU	European Union
FEWSNET	Famine Early Warning System Network
FAO	Food and Agriculture Organization of the United Nations
FISP	Farm Input Subsidy Programme
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
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

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