The Malawi Agricultural Inputs Subsidy Programme, 2005/6 to 2008/9

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Abstract
The implementation in Malawi of a large scale agricultural input subsidy programme in 2005/6 and subsequent years has attracted significant international interest. This paper reviews the background, implementation and impacts of the programme from 2005/6 to 2008/9. The programme is estimated to have raised national maize production by 26 to 60 percent. In so doing, the programme has contributed to wider economic growth and poverty reduction through increased food availability and higher real wages. The benefits of the programme relative to its costs have varied widely between years, depending on fertilizer and maize price levels, estimated yield responses to subsidised inputs, and the extent to which expenditure on input subsidies leads to greater use of inputs rather than displacement of commercial input purchases. On average, estimated benefit-cost ratios over the four years of the input subsidy programme have been modest but standard benefit-cost analysis does not capture all the benefits of the programme. There is considerable scope for changes in programme implementation to raise effectiveness, efficiency and benefits in delivering growth, poverty reduction and food security, but there are also practical and political difficulties regarding the implementation of some of these changes and questions about their effects. Consideration of applying Malawi's subsidy experience to other countries should take account of special characteristics of the Malawian maize economy, of ways of improving programme effectiveness and efficiency, and of possible returns that can be achieved from alternative public investments.

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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 Affairs
CPI	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

1. Introduction

The implementation in Malawi of a large-scale agricultural input subsidy programme in 2005/6 and subsequent years has attracted significant international interest. While much of this has applauded reported growth in maize production and food security in the country, there have also been significant criticisms and questions. These have focussed on the effectiveness and efficiency of the programme in raising maize productivity, its impacts on the development of sustainable commercial input markets, its high and (from 2005/6 to 2008/9) dramatically rising fiscal and macroeconomic costs, its opportunity costs (in terms of crowding out of other investments), its overall return on investment, and its sustainability.

Drawing on evaluations of the programme implemented in 2006/7 and 2008/9, this paper examines these issues[1]. It begins with brief reviews of (a) the background to the programme in Malawi and (b) historical and theoretical considerations in evaluating input subsidies. These reviews provide a foundation for consideration of the implementation and varied impacts of the programme from 2005/6 to 2008/9. The paper identifies significant achievements and costs of the programme. Achievements may not be as straightforward as simpler reports of the programme sometimes suggest. The paper concludes by considering ways in which the programme's effectiveness could be increased and of lessons for other countries which may seek to emulate Malawi's experience.

1. Background: overview of Malawian agriculture [2]

The importance of agriculture and of maize to the Malawian economy and to the livelihoods of most Malawian people is the critical backdrop to the agricultural input subsidy programme (AISP), together with the low agricultural and maize productivity, and associated high national and individual/household food insecurity[3]. Table 2.1 provides some key indicators of this, with large numbers of very poor people working on very small areas of land which are predominantly planted to maize. Continual cultivation of maize on the same land without addition of organic or inorganic fertilizers leads to low yields. Low yields then lead to inability to afford the purchase of inputs. Purchase of inputs on credit is also not possible for most farmers because rural credit markets are underdeveloped and the costs of credit administration are too high, as are risks for both borrowers and lenders, and low volumes of input demand and poor infrastructure and high transport costs lead to high input costs and inhibit the development of input supply systems in less accessible areas. Highly variable maize prices (discussed below) add to the risks of input use (whether purchased with cash or credit).

There are major difficulties in the pursuit of higher maize productivity. Only 10% of Malawian maize producers are net sellers of maize, while 60% are net buyers of maize (SOAS, 2008), and hence most (particularly poorer) people's livelihoods and food security are damaged by high maize prices. Increased maize productivity from the use of purchased inputs requires, however, that the use of such inputs is profitable for farmers, and this requires sufficiently high maize prices and yield responses to cover the costs of inputs. Unless substantial improvements can be made in yield responses, this leads to a significant dilemma between needs for low maize prices for large numbers of poor maize buyers (who are also significant maize producers), and needs for higher maize prices to allow increased returns from input use to reliably cover their purchase costs. Further difficulties arise from high maize price variability which damages both producers and consumers - as low prices present risks to producer investments in inputs by those producers who aim to produce a

[1] SOAS, 2008; Dorward and Chirwa (2009 a, b, 2010), Dorward et al (2010 a, b), Kelly et al (2010)

[2] This section draws heavily on material from SOAS (2008)

[3] Reasons for the high dependency on maize as opposed to other food crops include dietary preferences, different crops' relative calorific yields per ha in different agro-ecologies, farmers' familiarity with the crop, and longstanding strong government policies aimed at promoting maize production and input and crop marketing subsidies focused on maize.

marketable surplus, while high prices present risks to consumers (including the majority of smallholders). Poor access to international and domestic markets (due in large part to historically low public investment in transport infrastructure), seasonal scarcities, and poor local market development (due to low and uncertain volumes, high costs of transport, and uncertain government intervention) have led in the past to high intra- and inter- seasonal maize price variation (as well as higher farm gate input prices and lower farm gate produce prices), further depressing market development. Risks of high maize prices encourage poor consumers to grow as much of their own staple food as possible, even at very low levels of productivity. At the same time there are limited higher-return income earning opportunities within or outside agriculture. The result is a lock-in to low productivity maize cultivation.

Table 2.1: Background Information on Smallholder Agriculture, 2004/5

	North	Center	South	National
Rural population (% total pop)	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 after 04/05 harvest own food exhausted (actual)*	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	43
Kg fertiliser applied on all fields[4]	32	45	24	34
Kgs fertilizer applied on *fertilized* maize fields (kgs/ha)	139	111	77	101

Source: SOAS (2008) using data from NSO (2005) except * (own calculations from NSO 2006). $1 = MK140 for most of the period covered in this paper.

[4] Fertiliser rates on tobacco plots are roughly double rates across all plots.

Productivity and investment in productive activities is further constrained by poverty and by vulnerability to a wide variety of (often related) shocks, particularly low crop yields, sickness, high food prices, and loss of income from employment or remittances. Women, who play a key role in agricultural production and rural livelihoods, tend to be particularly vulnerable to these shocks. Macro-economic conditions prior to 2005 also inhibited growth, with high real interest rates, high inflation, and significant devaluations of the Kwacha. However, macro-economic management has improved dramatically since 2004.

Agricultural, rural and national economic development are therefore constrained by a number of interacting household, local and national vulnerability, poverty and productivity traps illustrated in figure 2.1. These constrain input and maize market development, investments in maize intensification, diversification out of maize into other agricultural and non-agricultural activities, the ability of (particularly poor) rural people to protect themselves from shocks, and wider local and national economic development. The result is a vicious circle of 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' escape from low productivity maize cultivation. These in turn inhibit the growth of the non-farm economy. Sustained improvements in maize productivity with low and stable prices are then required to drive diversification out of low productivity maize into a more diversified and productive economy that benefits all Malawians, particularly those who are currently poor and food secure .[5]

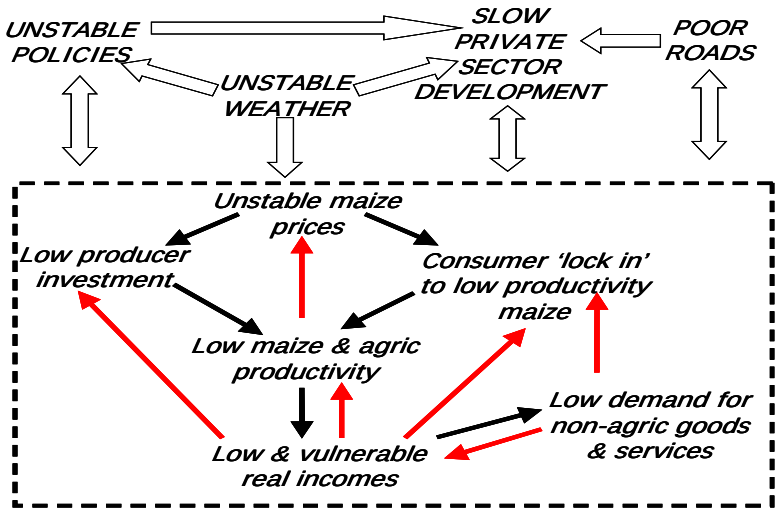

Figure 2.1 Vicious Circle of the Low Productivity Maize Production Trap6

Input subsidy and maize market intervention policies have been a longstanding and major though often contentious feature of the Government of Malawi's and varied donors' strategies to promote agriculture and food security. From the mid 1970s to the early 1990s, government financed a universal fertilizer subsidy, subsidized smallholder credit, and controlled maize prices. The system began to break down in the late 80s/ early 90s with cash flow difficulties, rising treasury deficits,

[5] Understanding of the nature, causes and relative importance of these problems varies (indeed elements of the analysis above are not universally accepted, nor is this brief summary a comprehensive account of the complex issues involved).

[6] Red arrows represent feedback effects

partial market liberalization and increasing importance of parallel grain markets. The state system of subsidised input loans, with loan recovery through farmers' delivery of grain to ADMARC, collapsed in the mid 1990s as a result of the coincidence of widespread harvest failure, multi-party elections, credit default, the rise of parallel markets, partial implementation of liberalization and structural adjustment policies and substantial devaluation (raising local fertilizer prices). With other policy changes drawing more productive smallholders away from surplus maize production into tobacco production there was then a widespread perception in Malawi in the mid 1990s that falling fertilizer support was leading to falling maize production and a food and political crisis. From 1998/99 government, with mixed donor support, reinstated a variety of interventions subsidizing maize fertilizer and seed access, with intermittent interventions in maize markets. 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 2001/2 to 2004/5) (see for example Harrigan, 2003).

Analysis of smallholder agriculture performance from the late 1990s is complicated by difficulties with data and in separating out the effects of poor rainfall and of policy changes responding to perceptions of an impending food crisis. In contrast to the widespread perception that maize production was falling through this period, official maize production and overall food production estimates show a strong rising trend through the 1990s to 2006, and per capita food production (including estimates of increasing cassava production) also had a modest rising trend through the same period. There were two years of very poor rainfall in 1991/92 and 1992/93, two years of good rainfall with universal distribution of small free fertiliser packs in 1998/9 and 1999/2000, poor rainfall and lower fertiliser subsidy and production with widespread hunger in 2000/1, 2001/2, and 2004/5[7], and good rainfall and a large fertiliser subsidy in 2005/6.

Fertilizer use also rose impressively through the 1990s, with 6.0% per year growth in fertilizer use on all crops and commercial and smallholder farms from 1984/85 to 2004/05. From the mid 1990s private input suppliers took over an increasing share of the market from ADMARC and SFFRFM (parastatals responsible for importing and distributing fertilizers for smallholders). By the end of the 1990s private input suppliers were responsible for over 70% of national fertilizer imports and for a large proportion of sales to smallholders. Across the 2002/03 and 2003/4 crop seasons, 43% of smallholders surveyed in a nationally representative survey purchased some fertilizer (Table 2.1). Smallholders *using fertilizer* on maize applied an average of 101kgs per hectare of maize (Table 2.1). Major parastatal involvement in fertiliser imports for subsidised fertiliser sales have, however, affected private sector sales and confidence in investment in imports and retail systems by varying, and debated, amounts.

Widespread uptake of fertiliser use on maize produced by smallholder farmers is constrained by two problems: profitability and affordability. Unsubsidised fertiliser use has not generally been profitable on maize produced for sale in Malawi from the mid 1990s to the mid 2000s [8]. It is, however, more profitable when maize is grown for own consumption with a higher subjective valuation due to farmers' fears of the effects of a bad year on maize purchase prices. For poorer farmers affected by this, however, affordability of fertiliser becomes a major problem. Poor farm household liquidity presents substantial difficulties for poor farm households with on the one hand a 'hungry gap' during the cropping period (when farmers need to invest labour, seed and other inputs

[7] A poor harvest in 2004/5 led to poor food security in 2005/6. The 2004/5 production year should not be taken as representing typical conditions prior to the subsidy programme.

[8] The post-harvest value to cost ratio has generally been less than 2 (widely considered to be 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, 2008), although this depends upon the yield response achieved and with high yield responses the VCR has been above 2 in some years (see Maize Productivity Task Force, 1997).

in crop production while food stocks from the previous season are running low, and children are particularly susceptible to sickness) and on the other very high costs in borrowing and an absence of low cost input finance services. Hungry gap problems at the livelihood level are exacerbated by rural economy market effects (depressing wage rates and asset prices and raising food prices). These problems are widely recognised as very severe for poor rural households in Malawi, causing major production and welfare problems in rural areas[9].

Improving the *profitability* of fertiliser use in maize production requires lower fertiliser prices (as a result either of greater efficiency in fertiliser supply and reduction in transport costs for importation and/or distribution of a subsidy), higher maize prices, and/or greater efficiency in the use of fertiliser (raising the grain output: N ratio)[10]. 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. This requires very substantial reductions in fertiliser prices and/or the development of low cost and accessible financial services. 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.

2. Review of input subsidies[11]

In order to understand the implementation, impacts, strengths and weaknesses of the Malawi Agricultural Input Subsidy Programme, it is helpful to draw together wider historical and theoretical lessons on input subsidies' implementation, performance and impacts.

a. Wider experience with agricultural input subsidies

Large scale (so called universal) agricultural input subsidies were a common and major feature of agricultural development policies in poor rural economies from the 1960s to the 1980s. They were subsequently criticised as a major element in fiscally and economically unsustainable policies that were inefficient, ineffective and expensive in Africa (eg World Bank, 1981). These policies distorted market incentives, blunted competitiveness and farmer incentives, and undermined the growth of private sector services. While subsidised input systems may have looked good for farmers (as regards services that were supposed to be provided), theoretical difficulties with subsidy benefits (see below) were compounded by diversion and inefficiency such that actual benefits to farmers were often very limited. Evaluations of the rate of return to alternative public investments in Asia tend to rank input subsidies as fourth or fifth on the list after investments in road infrastructure, agricultural research and development, education, and often other types of public investments (e.g., Fan et al., 2007; Economist Intelligence Unit, 2008). However there are also arguments that while returns to agricultural input subsidies were often low, they did in some countries at times yield substantial benefits. Such arguments stress the importance of differences between subsidies benefitting fertiliser suppliers and (poorer) farmers, falling returns over time where they are effective, and the need for judicious (and changing) decisions on the scale of different investments (recognising trade-offs, complementarities, differences in the timings of returns, and potential diminishing – and

[9] Table 2.1 for example shows that the median month for maize stocks to run out is from 4 to 6 months after harvest, and in 2003/4 one bag of fertiliser was around 10% of median per capita annual expenditure (and over 20% of median per capita expenditure of the lowest expenditure quintile) of rural households.

[10] A ratio of 15 was used in the calculations cited above based on what are believed to represent mean grain:N response rates to fertilizer application on farmers' fields. Improved management and uptake of hybrid seed provides the potential for higher ratios (in the range of 22 to 28kg maize per kg N applied). Hence improved farm management practices have the potential to make fertilizer use on maize profitable even without subsidy, though the affordability constraint still remains.

[11] This section draws heavily on Dorward (2009).

sometimes increasing - marginal returns across different investments) (for example Dorward et al., 2004; Djurfeldt et al., 2005; Timmer, 1989, for Indonesia; Fan et al., 2007, for India; Dorward, 2009).

There is limited information on the performance of most of the recent input subsidy programmes in Africa despite the very substantial investments of public funds in these programmes. However recent empirical evidence from Malawi and Zambia shows that (1) subsidies tend to be targeted disproportionately to better-off farmers rather than the poor and female-headed households where affordability constraints are most severe (Govereh et al., 2006; SOAS et al., 2008); (2) input subsidies have partially displaced commercial fertilizer demand, which has hindered policy objectives to promote sustainable development of commercial input distribution systems (Xu et al., 2009; Ricker-Gilbert and Jayne, 2009); and (3) the high costs of large scale input subsidies means that there are very substantial opportunity costs in terms of public investments foregone, investments which, as shown by the Asian experience discussed earlier, may have greater long-term impacts on poverty reduction and agricultural growth. Moreover, Kenya has achieved impressive growth in fertilizer use on food crops based on strong commercial demand for inputs after the liberalization of input marketing and foreign exchange controls, without the use of subsidies (see Ariga et al., 2008; Ariga and Jayne 2009), and the potential applicability of this model, or parts of it, to other African countries needs to be considered, taking account of particular features of the Kenyan situation and experience . Dorward (2009) in a review of a number of input subsidy programmes across Africa also notes that there appear to be tendencies (a) for these programmes to focus on production objectives and producer welfare (largely ignoring potential benefits for consumers and for wider pro-poor economic growth), (b) for poor integration of many programmes with complementary investments, and (c), in some programmes, for an unfortunate lack of interest in improving effectiveness and efficiency. Two further commonalities are (a) limited focus on replenishing soil fertility and (b) a strong prevalence of heavy subsidies (50% to 100% subsidy rates) on rationed inputs (Dorward, 2009).

b. Theoretical benefits and costs of agricultural input subsidies

Conventional arguments for subsidies in agricultural development have focussed on the promotion of increased agricultural productivity through the adoption of new technologies (Ellis, 1992). Reduced costs of subsidised inputs increase their profitability and reduce risks perceived by farmers in adopting them. Together with credit and extension services, input subsidies were supposed to help farmers implement, benefit from and then, with the withdrawal of the subsidy, themselves fully fund efficient input purchases and use.

Supply and demand analysis of input subsidies shows that due to deadweight losses a subsidy can only generate a positive net economic return to a country if it addresses some market failure (Siamwalla and Valdes, 1986). This may occur where

(a) farmers' private costs of working capital for input purchase are greater than the social cost of capital,
(b) farmers' lack of knowledge about the benefits of inputs means that their expectation of the production benefits from input use are less than the benefits that they will gain,
(c) there are learning costs with input use such that initial farmer returns are low but these will increase with experience (see for example Ellis, 1992; Crawford et al, 2006; Morris et al, 2007), and
(d) farmers' risk assessment and aversion in investing working capital in input purchase and use is higher than society's risk assessment and aversion.

The size of the deadweight loss and the distribution of benefits between consumers and producers also depend upon the elasticities of supply and demand. Demand or supply inelasticity tends to be associated with smaller deadweight losses. Inelastic demand is associated with larger shares of consumer surplus benefits, while inelastic supply is associated with larger shares of producer benefits. Staple food markets in land locked countries tend to be associated with more inelastic

demand by poor consumers (where prices lie between export and import parity prices). Demand tends to be more elastic for cash crops, and particularly export cash crops[12].

Other sources of subsidy inefficiencies arise where (a) part of the cost of the subsidy goes to reducing the cost of production for produce that would be produced anyway, (b) subsidies bid up demand and prices for land, labour or inputs, and hence subsidies may be passed back to suppliers of these inputs[13], and (c) rationing leads to opportunities for those controlling subsidised inputs to demand payments for provision of subsidised inputs. Another major concern with input subsides concerns the extent of leakages and diversion away from their intended use, as a result of (a) diversion between products, (b) diversion from intended beneficiaries to others within the country, and (c) cross border leakage.

A final, crucial point to note is that the technical efficiency of input use in generating production is critical in determining deadweight losses, distribution of benefits between producers and consumers, and wider economic gains. This depends upon the quality and appropriateness of the inputs to the product they are used on, the timing of their delivery to farmers, the availability of complementary resources (for example seed and fertiliser together), agro-ecological conditions, and farmers' technical skill or competence in using the inputs.

This analysis suggests that large scale input subsidies should be focussed

- on those producers who are not using inputs because of market failure,
- on crops and areas where increased input can use induce a large supply shift (this may also require complementary infrastructure and services for input delivery, extension and output markets), and
- on stimulating products with inelastic demand and supply (particularly inelastic demand) among poor producers and consumers: staple grain production tends to have these characteristics in poor large or land locked countries.

The analysis also emphasises the importance of

(a) consumer benefits in addition to (or rather than) producer benefits for achieving economic and welfare gains from subsidies,
(b) subsidy implementation that reduces deadweight losses and rents from straight transfers, leakages, and high administration costs, and
(c) comparing distributional impacts and multipliers from expenditure on input subsidies with\ alternative (tax and subsidy or transfer) instruments for changing income distribution and for stimulating growth.

The conclusions from this neo-classical supply and demand analysis influenced conventional wisdom on difficulties with input subsidy programmes: in controlling costs, in achieving 'exit strategies' after subsidy programmes have become entrenched, in effective targeting of input subsidies to particular farmer types, in over use of inputs, in regressive benefits (favouring larger farmers who can access subsidised inputs), and in market distortions where parastatal involvement crowds out private sector investment in input supply systems and provides opportunities for corruption.

In recent years some scholars and many government policy makers have departed from orthodox neo-classical thinking on input (and particularly fertiliser) subsidies. Factors giving rise to this in

[12] This analysis only applies to subsidies implemented on a large enough scale to affect output prices - small scale subsidies that do not significantly affect product prices are equivalent to highly elastic product demand: subsidy benefits are largely captured by suppliers / producers, and deadweight costs depend upon the elasticity of supply

[13] This is not a problem where the providers of land and labour are poor, indeed it can promote pro-poor growth.

Africa include perceptions by some that liberalisation policies have failed to support sustainable intensification of staple food crop production; political demands for fertiliser subsidies; tensions among donors facing such demands; concerns about declining soil fertility; and interest in using input subsidies as an instrument for social protection policies and as a means of promoting input market development.

On the basis of this analysis, Dorward (2009) suggests that the following design and implementation features of subsidy programmes are important if they are to be effective and efficient in stimulating increased productivity and broad based growth:

- Large unit (or %) subsidies on rationed supplies targeted to credit constrained farmers to reduce *input affordability* problems.
- *Targeting* access to subsidised inputs for specific household types where input use is constrained by market failures which the programme effectively addresses, where these inputs can be used effectively and efficiently[14], and where substantial political, economic, welfare, equity and administrative challenges in effective and low cost targeting can be overcome.
- *Rationing* to control the costs of input subsidies with large per unit or % subsidies and limited secondary markets in which recipients sell subsidised inputs to others.
- Encouragement of *private sector input supply* systems' efficiency and investments by economies of scale and by competition in selling larger volumes of inputs (especially in remoter and previously poorer and less productive areas and producers), with measures to limit uncertainty and diversion of suppliers' focus to capturing subsidised sales without developing retail systems.
- *Dynamic effects on pro-poor growth* through higher land and labour productivity in staple food production, lower food prices and higher producer incomes that facilitate wider non-agricultural development, market thickening, and reduced coordination and transaction costs and risks in poor rural economies.
- Effective and efficient *entitlement and distribution systems* supporting targeting, rationing, supply system development, control of secondary markets and leakages, and cost control. A variety of paper vouchers, scratch cards and electronic systems (involving bank cards, electronic 'smart' cards and/or mobile phones) may be used as evidence of entitlement. Different systems offer different potential benefits and political, technical, administrative and social challenges within communities and households. Entitlements may be input specific or flexible with regard to inputs allowed, and may also be fixed value (with a variable top up at redemption), or variable value (with a fixed top up). There are important interactions between entitlement systems, secondary markets, recipient choice (of inputs and suppliers), control of fraud and of programme costs, and gendered access to and control of subsidised inputs within households.
- *Complementary investments, policies and instruments* are critical for subsidy effectiveness and efficiency, with balanced investments in the subsidy programme itself, in research and extension support, in transport and communications infrastructure, and in efficient and stable output markets[15].
- Matching of *political interests* with more technical and bureaucratic needs for cost control, limited leakages, targeting, rationing and private sector development.

Given the experience with subsidies in Africa discussed earlier, implementing some of these features is a major challenge.

c. Issues to consider in evaluating agricultural input subsidies

The 'success' of an input subsidy programme has to be judged against the objectives of that programme. Input subsidy programmes can and do have a wide range of different possible

[14] For this, complementary constraints to effective use of inputs by targeted beneficiaries must be addressed.

[15] Efficient and stable output markets may require less government intervention in direct market operations but more focussed investments in market insurance and in facilitating infrastructure and institutions.

objectives: wider (pro-poor) nomic growth, benefits for (poorer) consumers from lower output prices, national (or household) ood self sufficiency or security, increased input adoption, and efficiency of use, benefits for orer) producers, input supply system development, soil fertility replenishment, and political efits. Most, but not all, of these objectives can be mutually complementary, depending h a programme is implemented. The balance of programme objectives, and their context ould then determine the key design and implementation elements of input subsidy programmes as scussed above in the previous sub-section.

Figure 3 provides a conceptu ramework that identifies key variables and relationships affecting input subsidy programme im ts and guides our discussion of the Malawi Agricultural Input Subsidy Programme.

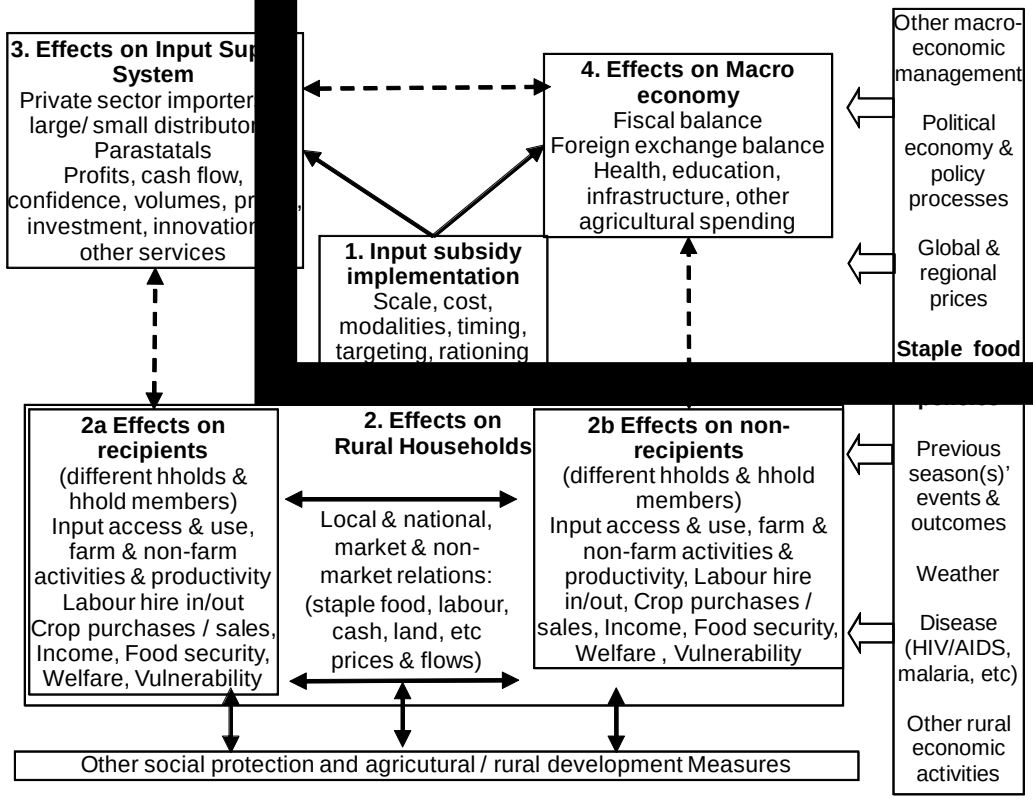

Figure 3.1 Conceptual framework for investigating agricultural input subsidies impacts

(adapted from SOAS et al, 2008)

3. The 2005/6 to 2008/9 Malawi Agricultural Input Subsidy Experience[16]

Following severe food security difficulties in the early part of this century, and particularly after the poor 2004/5 production season, and in line with election manifesto commitments, the Malawi government decided to implement in 2005/6 a very large scale input subsidy programme across the country. The programme was very popular and has been repeated in subsequent seasons, building on core experience but expanding the programme and modifying its components and implementation systems from year to year. Core elements of the programme common to the different years have been its use of vouchers targeting roughly 50% of farmers across the country to receive fertilisers for maize production, with further vouchers for improved maize seeds and for fertilisers for tobacco. The core objective of the programme (which has been refined over time) has been to increase resource poor smallholder famers' access to improved agricultural inputs in order

[16] This section draws heavily on SOAS (2008), and on Dorward and Chirwa, 2009.

to achieve food self sufficiency and to increase resource poor smallholder famers' incomes through increased food and cash crop production. The main features of the programme across the four years are summarised in table 4.1, and details of its design, implementation and various achievements are detailed in the following sections.

Table 4.1 Summary of 2005/6 to 2008/9 programmes

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

* Seed or fertiliser coupon (NSO, 2008 Welfare Monitoring Survey)

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

Sources: Logistics Units reports; Nakhumwa (2006); SOAS et al (2008); MoAFS (2008) ; Dorward and Chirwa (2009); key informants; MoAFS Implementation guidelines; GoM budget statistics; Dorward et al (2010); NSO (2009).

a. Programme design and implementation

The 2005/6 programme provided the base or foundation on which subsequent programmes have built. We therefore describe this in more detail before considering changes made in subsequent programmes.

The objectives of the programme were to promote access to and use of fertilizers in both maize and tobacco production in order to increase agricultural productivity and food security. Fertiliser coupons were distributed to districts and within districts to Extension Planning Areas in two rounds. In the first round allocation was broadly in proportion to cropped maize and tobacco areas. Coupons were distributed to districts and Traditional Authorities (TAs) by the Ministry of Agriculture and Food Security (MoAFS). TAs were supposed to allocate coupons between villages, to Village Development Committees, who were then supposed to identify recipients to receive two coupons which they could then redeem, at a reduced cash price, for any of four fertilizer types (see below). There was considerable variation between areas in the criteria determining prioritization and selection of beneficiaries, numbers of people receiving coupons, and numbers of coupons received per recipient household. A second, supplementary round of coupon allocation and distribution was made later in the season. 6,000MT Open Pollinated Variety (OPV) maize seed was also offered for sale without coupons at a subsidised price of MK150[17]/3kg as compared with a market price of MK500/3kg. 48% of fertiliser purchases were supplied by private sector importers, but all distribution of subsidised inputs was by the parastatals ADMARC and SFFRFM.

[17] The Malawi Kwacha has held its value at approximately US$1 = MK140 from 2005/6 to 2008/9.

Holders of coupons were entitled to redeem coupons for fertilizer at the rate of 1 coupon and MK950 for one 50kg bag of 23:21:0 +4S or of urea ('maize fertilisers'), and at 1 coupon plus MK1,450 per bag of Compound D or of CAN ('tobacco fertilisers'). These prices on average represented a two-thirds subsidy to farmers on the market cost of inputs. Coupons intended for different types of fertiliser were not marked as such and many coupons allocated for 'tobacco fertilisers' may have been used to buy 'maize fertiliser'. Sales continued into January, and in different areas were limited either by a lack of fertilizer stock or by a lack of coupons. In the latter case supplementary coupons were used in some areas, but shortages of fertilizer in time for it to be agronomically useful meant that significant numbers of coupons were not used. ADMARC/SFFRFM reported total subsidy sales of 131,803 tonnes (representing 2.62 million coupons).[18]

The programme is reported to have cost MK7.2 billion against a budget of MK5.1 billion. The reported programme cost excludes overhead costs for ADMARC and SFFRFM but it is likely that it allows for only partial deduction of farmer payments to ADMARC and SFFRFM for coupon redemption: these amounted to a total of MK2.7 billion.

Following the popularity of the 2005/6 programme in Malawi and perception of its success, the government decided to implement the programme in 2006/7 with a number of modifications (see table 4.2). These involved an increase in the overall amount of maize fertilisers to be subsidised, a standard redemption price of MK950 per bag for all fertiliser types, improved coupon security (with differentiation by fertiliser type), involvement of the logistics unit (a unit largely funded by the UK Department of International Development, which had played a major role in the logistics for the nation wide starter pack and targeted input programmes from 1998/99 to 2004/5), involvement of some large input supply companies in retail sales of subsidised fertiliser, and maize seed vouchers which could be exchanged at a wider range of outlets (including agro-dealers) for different quantities of OPV or hybrid[19]. The seed component, some logistic unit costs and an independent programme evaluation were funded by donors, who had not directly financed any part of the 2005/6 programme (other than through budget support). Donors also funded a buy-back scheme, which reduced the risks to government of carrying stocks over at the end of the year if private sales were to lead to lower than expected sales by ADMARC and SFFRFM. This was an important measure in reducing the risks to the government of holding unsold stock of fertiliser if greater private sector sales led to reduced sales by parastatals.

[18] No information is available on seed sales.

[19] A standard maize subsidy pack therefore consisted of one voucher for a 50kg bag of 23:21:0 +4S, one voucher for a 50kg bag of 23:21:0 +4S, and one voucher for improved maize seed. A standard tobacco subsidy pack consisted of one voucher each for a 50kg bag of Calcium Ammonium Nitrate (CAN) and of D Compound. The fertiliser vouchers were redeemable for MK950, and the seed voucher required no top up, and could be used to purchase 2kg of hybrid seed or 3 or 4 kg of OPV seed, depending on the price set by the seed supply company.

Table 4.2: 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, coffee & tea 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 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; Nakhumwa (2006); SOAS et al. (2008); MoAFS (2008); key informants; Dorward and Chirwa (2009); MoAFS Implementation guidelines.

Planned and achieved subsidy sales and costs in 2006/7 (and other years) are shown in table 4.1,. Supplementary fertiliser vouchers issues and the availability of fertiliser for sales by private companies (who sold just under 30% of subsidised sales) together led to higher sales volumes than budgeted and these, together with higher prices than budgeted, led to significant budget overruns. These problems were not faced with seed sales where no extra coupons were issued.

Growing experience with the programme led to consolidation in 2007/8 of many of the changes made in 2006/7, together with further changes to extend the scope of the programme. Programme objectives and beneficiary targeting criteria were amended to give greater emphasis to concerns for vulnerable households. Targeted quantities of subsidised maize fertiliser and seed were again increased, to roughly equal disbursements the previous year. Changes were made to coupon allocation systems between districts to provide greater weight to the number of farming households (and less weight to crop areas), leading to an increasing proportion of coupons allocated to the more densely populated Southern Region, where poverty and poverty incidence are greatest. Following problems in some areas in 2006/7, systems for allocation and distribution of coupons within districts were also modified to give less power to TAs and more responsibility to MoAFS staff. In addition to the maize seed vouchers provided with maize fertiliser coupons, extra 'flexible vouchers' for maize or legume seed were issued (allowing farmers to choose what seed they wanted, though in fact

legume seed supplies were very limited), and coupons were also distributed through MoAFS Divisional Offices (ADDs) for cotton seed and chemicals. A 'remote area premium' was introduced to provide incentives to private retailers to extend their networks into areas with low coverage by private retailers, by providing a 'premium' on the subsidy paid to private sector retailers for sales of subsidised fertilisers against identifiable vouchers issued to beneficiaries in designated 'remote areas' with higher transport and distribution costs (with the vouchers identifiable by their location code).

Subsidised fertiliser volumes were again significantly over budget, with associated cost overruns, so that with higher than budgeted input prices programme costs were 29% above the budget in 2007/08 (compared to 18% in 2006/07). However, private sector subsidy sales were roughly the same as the previous year (increasing by only 6% from 49,000 mt to 52,000mt) whereas parastatal sales increased by approximately 30% from 125,000mt to 165,000mt).

A number of further changes were made to the programme for 2008/9, which was an election year[20]. A farm household register compiled the previous year was updated and used to list coupon allocations to individual beneficiaries in open village meetings led by teams involving MoFS and local government staff. An attempt to print coupons in the government printer was followed by a significant security breach, and central and northern region vouchers were then printed outside the country with extra security features. The flexible maize and legume seed voucher and cotton input systems were continued, and grain pesticides were also subsidised, and some subsidised fertilisers issued to tea and coffee farmers. Private retailer involvement in the sale of subsidised fertilisers was, however, discontinued at a very late stage in the season. Contracts for extra fertiliser purchases beyond that originally budgeted were awarded during the season. The programme went massively over budget largely as a result of soaring international fertiliser costs, but there was also an approximate 15% overrun in quantities of inputs subsidised.

b. Implementation achievements

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

Programme scale: The scale of the programme has been growing each year, and involves complex and very significant logistical and organisational challenges to tight deadlines. Major tasks are shown in figure 4.1. This is a highly simplified summary, with a complex set of activities needed for the completion of each task. It also does not show the scale of these tasks and of the interactions between various stakeholders: in 2008/9, for example, this involved selection of over 1.5 million fertiliser coupon beneficiaries from over 2.5 million farm households, printing and distribution of 5.9 million coupons, and purchase and distribution of over 3.4 million bags of fertiliser – all to tight deadlines, to farmers (a significant number 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 commodities worth approximately US$220 million in total, with each fertiliser coupon worth more than 10% of annual household income for the more than 40% of the population below the poverty line.

[20] Presidential and parliamentary elections were held in May 2009.

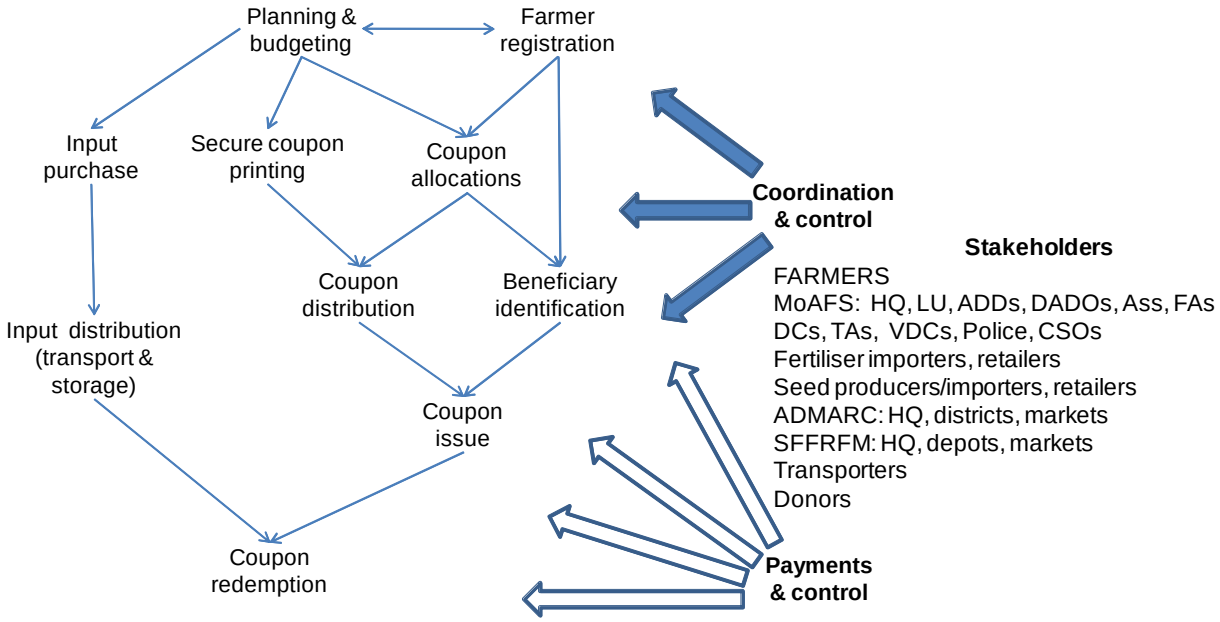

Figure 4.1. Major tasks in programme implementation

The implementation challenges posed by this should not be under-estimated, and it is significant that Malawi has been implementing such activities at varying scales annually since the inception of the starter pack programme in 1998 (see below) and has therefore built up both systems and considerable expertise in these tasks.

Innovation and adaptation: The 2005/6 subsidy programme built on Malawi's innovative experience in implementing the starter pack (SP) and targeted input programme (TIP). These involved large scale registration and targeting across the country; development of systems using vouchers; coordination across different government, parastatal, private sector, donor and community stakeholders; and substantial logistical challenges. The 2005/6 programme involved a change in objectives (from an emphasis on social protection and food security for vulnerable households in the TIP to national food production and self sufficiency), an increase in scale of subsidised inputs (from around 50,000 mt of fertiliser in 2004/5 to 130,000mt in 2005/6), the addition of tobacco inputs, and cash redemption of vouchers.

Following the experience of 2005/6, the government has, with other stakeholders, implemented further innovations in attempts to address implementation difficulties, to improve performance of the programme (discussed below), and to broaden programme impact. These changes emerged from formal and informal management and evaluation reviews and lesson learning within the government (formal internal evaluations were conducted in 2006/7 and 2007/8); concerns of and discussions with other stakeholders (donors, private sector fertiliser importers and seed and fertiliser suppliers, parliamentary committee on agriculture, civil society; external evaluations (commissioned by CISANet for 2005/6 and by the Government, DFID and USAID for 2006/7 and by the Government and DFID for 2008/9); and changing policy concerns in a changing economic and political environment.

The major modifications in 2006/7, 2007/8 and 2008/9 were discussed briefly above in section 4a and summarised in table 4.2. They concerned

- the extent and modalities of private sector involvement in fertiliser imports, fertiliser sales and seed sales, with a buy-back scheme to reduce government stock holding risks and, in 2007/8, a premium to stimulate private retail network development in more remote areas, but exclusion of the private sector from fertiliser sales in 2008/9;
- recognition of the importance of including vulnerable households among targeted beneficiaries, with increasing volumes of inputs for maize production and modified district / EPA allocation systems;

- trialling of flexible vouchers for seed inputs and addition of cotton inputs and grain storage pesticides;
- the introduction of beneficiary registration and more open and more tightly managed beneficiary selection, voucher distribution and market monitoring systems;
- coupon design, printing, security and farmer redemption prices; and
- shared funding with donors of some programme components.

Implementation Performance: Effectiveness and efficiency of implementation can be considered in terms of (a) volumes of subsidised inputs disbursed, (b) the timing of subsidy sales and supplier payments, (c) targeted beneficiary access to inputs, and (d) cost. We consider these in turn.

As shown earlier in table 4.1, both planned and disbursed ***volumes of subsidised inputs*** have increased steadily from 2005/6. Disbursement targets were not met in 2005/6, but fertiliser sales have been exceeded in 2006/7, 2007/8, and 2008/9 by 16%, 27% and 19% respectively. Exceeding disbursement targets demonstrates considerable success in meeting demand, but also suggests difficulties in controlling disbursement and cost overruns.

Table 4.3. 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; Nakhumwa (2006); SOAS et al. (2008); MoAFS (2008); key informants.

Timing of subsidy sales is determined by the timing of availability of inputs in markets and by timing of issue of vouchers to beneficiaries. It is critical for the effective use of seed and fertiliser at the start of the agricultural season. For fertilisers the timing of input availability depends upon timing of tendering of input purchases and supplier deliveries to depots, and on staffing and stocking of input markets (for parastatal sales) and upon subsidy redemption contracts with retailers and their stocking and staffing of input sales points for private sector sales. Coupon issue depends upon timing of beneficiary registration, voucher allocations, voucher printing, voucher distribution to districts, and district distribution payments. Information on some of these variables is given in table 4.4. This shows general improvements in performance over time as regards earlier award of seed and

fertiliser contracts and earlier fertiliser deliveries to depots and uplifts. Information on the timing of fertiliser sales is incomplete but it appears that although this improved from 2005/6 to 2006/7, there has been little improvement since then, and it is particularly important to increase sales by the end of November – which were highest in 2008/9 but still only 30% of total. Receipt of seed vouchers by the logistics unit is determined by the timing of sales and the speed of voucher processing by seed suppliers – it seems that there were problems with both in 2007/8.

Targeted beneficiary access to inputs is determined by coupon allocation and issues and by their use of coupons, which may be affected by availability of subsidy inputs in accessible markets and by any 'tips' needed to redeem coupons. Comprehensive management information is not available on these topics, and household surveys provide the only systematic information available. Results from focus group discussions and household surveys examining the 2006/7 and 2008/9 programmes (SOAS et al, 2008; Dorward et al,2010)[21] suggest

- in 2008/9 65% of farm households received one or more fertiliser coupons, with an average of 1.5 coupons per household receiving coupons and of 1.1 coupons per household across all households. (Equivalent figures for 2006/7 were 54%, 1.7 and 1.0.)
- targeting criteria were highly variable across different areas[22];
- overall targeting recommendations were followed to some extent in that there was a tendency for targeting to reach households which are productive full time farmers. However, household survey data for the of 2006/07 and 2008/9 seasons indicates that coupons were disproportionately targeted to households with relatively more land, more assets, and to male-headed households. Smaller proportions of fertilizer coupons were given to households in the bottom half of the wealth and income distribution;
- in some areas, particularly the south and centre, coupon allocations were modified so that in 2008/9 just under 40% of households in these regions and 36% nationally received one fertiliser coupon (rather than fewer receiving two);
- open meetings for coupon allocation were introduced in 2008/9 and appear to have had some success in increasing the proportion of coupons and subsidised fertiliser going to poorer households (Chirwa et al, 2010)
- key informants tended to under-estimate the proportion of households receiving subsidised inputs as compared with information from household interviews which revealed that a larger proportion received subsidised inputs;
- In 2006/6 75% of ADMARC and private suppliers and 100% of SFFRFM outlets were reported to have suffered from frequent major queues – with a similar figure of 75% reported across ADMARC and SFFRFM outlets in 2008/9
- In both 2006/7 and 2008/9 household surveys 5% of coupons were reported to be accessed with some payments, with a median price of MK1000 in 2006/7 and of MK2,000 in 2008/9.
- In 2006/7 a 'tip' was paid to retail market staff for redemption of about 20% of fertiliser coupons with a mean price per bag of just over MK1000 (compared with the official price of MK950) and with no significant overall differences between parastatal and private sector suppliers. In 2008/9 14% of fertiliser coupons were reported to require a 'tip' for redemption, with a median tip of 200MK again giving a price of MK1000 per bag.

There are considerable difficulties in determining the extent of **fraud** affecting the programme. This can arise in a number of ways- through allocation of vouchers to non-existent beneficiaries (and their diversion to government staff, traditional leaders or politicians), through the direct allocation of

[21] No equivalent information is available for the 2005/6 and 2007/8 seasons.

[22] 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.

vouchers to people who do not satisfy beneficiary criteria, through printing of extra or counterfeit vouchers, and through payment of 'tips' as discussed above.

Each year of the subsidy programme there are significant press and anecdotal reports of such fraud. Determination of its extent is rendered difficult by the lack of formal and transparent audit systems covering the whole programme and by discrepancies between MoAFS and NSO estimates of the total number of farm families in Malawi, with MoAFS estimates (MoAFS estimates of farm households were 33% and 47% above NSO estimates in 2006/7 and 2008/9 respectively). SOAS (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. There appear to be more anecdotal reports of fraud within the system as time goes on, and although Dorward et al (2010) suggest that NSO estimates may well underestimate the number of farm families in Malawi, it would appear unlikely that they underestimate numbers by a third, and there are risks (and anecdotal reports) of increasing numbers of villages and of some 'ghost villages' suggesting significant diversion of subsidised inputs away from the intended beneficiaries. The discrepancy between NSO and MoAFS estimates of the number of farm families is being jointly examined by the NSO and MoAFS in order to resolve this issue.

As regards the extent to which counterfeit or non standard vouchers (those with serial numbers outside the ranges recorded by the Logistics Unit) have been accepted by different outlets, records for 2007/8 show that these (and sales without vouchers) accounted for 27% of ADMARC/ SFFRFM sales and 3% of private retailer sales. Rapid return of vouchers to the Logistics Unit is important for early identification of markets accepting counterfeit or non standard vouchers. Private retailers generally return coupons quickly in order to receive payment, but ADMARC and SFFRFM have been much slower at this. Voucher returns by ADMARC and SFFRFM during the season have improved over the three years for which records area available (see table 4.4). In 2008/9 a major security breach in the printing of vouchers led to reprinting of more secure vouchers for issue in two regions.

As noted earlier overall ***programme costs*** have been over budget and increasing. The subsidy program in 2008/09 accounted for 80% of the public budget to agriculture and 15% of the total national budget. This is due to a combination of increasing subsidy volumes and large increases in fertiliser prices.

Data on estimated per unit fertiliser costs and on total programme costs are given in table 4.4, excluding ADMARC overhead costs. Both fertiliser prices and transport costs have been rising. Estimated per unit total fertiliser cost increases from 2005/6 to 2006/7 (25%) are higher than would be expected from international prices which were static over the same period, but from 2006/7 to 2007/8 (22%) are lower than would be expected from international prices, which rose by around 50% or more – so that the cost increase from 2005/6 to 2007/8 is in line with international price increases. Marked monthly variation in international fuel prices in mid to late 2006 and 2007 makes it difficult to undertake equivalent analysis for transport costs. Fertiliser cost increases from 2007/8 to 2008/9 also appear to have been roughly in line with increases in international price increases over the same period (about 125%).

There have been substantial cost overruns in the implementation of the programme. For example, in 2005/06 the programme spent 41% above the budget and this increased to just under 70% in the 2006/07, declined to 42% in the 2007/08 season and was over 100% in 2008/9. The high cost overrun in 2006/07 was partly due to poor budget provision, as there were modest increases in volumes and lower costs of fertilizers compared to 2007/08. Programme costs rose from just over 60% of Ministry of Agriculture and Food Security budget in 2006/7 and 2007/8 to 74% in 2008/9.

Aside from the problems of high fertiliser prices in 2008/9, the programme has faced major challenges in controlling the volume of subsidised fertiliser disbursed. Three alternative (and complementary) approaches may be used: (a) control of the number of coupons issued, (b) control of physical stock available, and (c) control of total sales by closing further sales once the total budget quantity has been sold. Control of coupon issues is in principle the best approach, but is undermined by counterfeit coupons and by any high level political pressures that may demand extra coupon

issues. Control of physical stock is difficult if the private sector is involved in retail subsidy sales (and thus represents an unfortunate difficulty such involvement), and may result in genuine beneficiaries being denied the opportunity to redeem genuine coupons. Closure of the programme once target sales have been achieved suffers from the same disadvantage, and in addition requires timely reporting and monitoring of sales.

Table 4.4. Fertiliser and Programme Costs

	2005/6		2006/7		2007/8		2008/9	
	planned	actual	planned	actual	planned	actual	planned	actual
Fertiliser costs (US$/mt):								
Parastatal: delivered at depots		n/a		454		555*		1,204**
Parastatal: Transport etc		n/a		36		45		46
Parastatal: Total		393		490		600		1,250
Private retailers: Total		n/a		490		612		na
All suppliers		393		490		590		1,250
Programme costs:								
Malawi Government	36.4	51.4	51.4	81.4	73.6	109.6	127.0	248.8
Donors (US$ mill)			12.5	9.5	5.7	7.1	12.1	37.8
Total (US$ mill)	36.4	51.4	53.6	90.9	82.1	116.8	139.1	284.6
Net of farmer payments		32.0		73.9		95.4		241.7
Total as % MoAFS budget	n/a	n/a	43%	61%	51%	61%	61%	74%
Total as % national budget	4.3%	5.6%	5.4%	8.4%	6.7%	8.9%	8.5%	16.2%
Total as % GDP		2.1%		3.1%		3.4%		6.6%

* 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; Nakhumwa (2006); SOAS et al. (2008); MoAFS (2008); key informants; Dorward and Chirwa (2009); MoAFS Implementation guidelines.; GoM budget statistics; Dorward et al (2010).

The macro-economic impacts of these high costs are discussed later. These rising costs have been met by increasing budgetary allocations to the Ministry of Agriculture and Food Security, and they have not crowded out other Ministry activities in terms of actually cutting budgetary allocations to them. However, the opportunity cost of the programme is an issue in terms of foregone investments that could have been achieved with those funds. The programme also consumes very large amounts of staff time and other resources, as these are diverted from other activities to management and implementation of the programme in the critical time before and at the start of the cropping season. Similarly while financial resources allocated to the subsidy programme have grown dramatically since the start of the programme (more than 5 times), financial resources allocated to other activities have remained largely static or shown only small increases. This poses severe challenges to other essential research and extension activities of the Ministry.

c. Input supply impacts

The programme has had major and mixed impacts on private sector input suppliers. Impacts have to be considered separately for fertiliser importers, fertiliser retailers, seed suppliers, and seed retailers. Within retailers of seed and fertiliser it is important to distinguish between small independent agro-dealers on the one hand and retail outlets of larger companies involved in importation and both wholesale and retail sales.

Fertiliser importers have been responsible for generally increasing proportions and volumes of government subsidy sales, with particularly large volumes in 2008/9 (see table 4.5). They have clearly benefited from their growing share in imports, though they have faced some difficulties from exposure to foreign exchange losses with delays in payments in Malawi Kwacha. In as far as these

risks are factored into their tender margins, these raise fertiliser costs for government. Some importers have expressed concerns about increasing competition in import tenders from new players without proper qualification criteria, leading to award of some tenders to suppliers who are unable to deliver. Again, if these lead to late cancellation and re-ordering at short notice, they may raise fertiliser costs for government.

Table 4.5 Private sector involvement in subsidised fertiliser sales

	2005/6	2006/7	2007/8	2008/9
Private sector fertiliser subsidy tender deliveries (mt)	70,000	99,386	97,845	162,840
Private sector fertiliser subsidy tender deliveries (%)	48%	72%	71%	88%
Private sector fertiliser retail (%)	0%	28%	24%	0%

Source: Logistics Unit reports; SOAS et al. (2008); Dorward and Chirwa (2009).

Maize seed suppliers have also benefited from significant growth in sales over the life of the programme. Prices are negotiated between government and the seed suppliers association. This involves a difficult balance between competition and coordination in supply.

With regard to retail sales, it is helpful to consider three processes by which the subsidy programme affects retail sales, and the different effects of these processes on retail outlets selling and not selling subsidised inputs. These are set out in table 4.6.

Table 4.6 Impacts of subsidy programme on seed and fertiliser retail outlets

Processes by which the subsidy programme affects retail sales	**Participating retail outlets**	**Excluded retail outlets**
Displacement of commercial sales by subsidy sales	Loss of sales	Loss of sales
Sales of subsidised inputs	Gain in sales	No effect
Gain/ loss of customers going to outlets to redeem their subsidy vouchers	Gain in sales	Loss of sales
General increases in demand as a result of programme induced growth & income / cash gains in previous season	Gain in sales	Gain in sales
Fertiliser players	*Retail chains in 2006/7 and 2007/8*	*Agrodealers in all years, retail chains in 2005/6 and 2008/9*
Seeds players	*Agrodealers & retail chains from 2006/7 to 2008/9*	*Agrodealers & retail chains in 2005/6 only*

Displacement of commercial sales occurs where a farmer chooses not to buy an input received on subsidy when they would have bought it commercially if the subsidy had not been available. This affects private retail outlets irrespective of their participation as subsidy retailers. Displacement is difficult to estimate because even without subsidies farmers' commercial purchases change from year to year with changes in input prices, output prices, and their access to seasonal finance. Input suppliers appear to be 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. Displacement rates have however been estimated from examination of changes in aggregate sales SOAS (2008) and from panel data analysis of farmer purchases (Ricker-Gilbert et al, 2009).

Displacement estimates from examination of changes in aggregate sales in 2005/6 and 2006/7 were 20% to 30% and 30% to 40% respectively (with higher displacement for tobacco fertilisers and lower displacement for maize fertilisers) SOAS (2008). Displacement estimated from panel data analysis of farmer purchases in 2006/7 is 29% (Ricker-Gilbert et al, 2009) and in 2008/9 is 3% (Ricker-Gilbert and Jayne 2010) but some further displacement may be expected if some subsidised fertilisers are not received by smallholders. It has not been possible to estimate displacement from aggregate fertiliser sales data for 2007/8 and 2008/9 due to lack of data on aggregate commercial sales. Table 4.7 shows incremental fertiliser use estimates for 2005/6 and 2006/7 and predictions for 2007/8 and 2008/9, assuming similar implementation in these years[23]. Displacement of maize seed sales appears to be much lower, with strong growth in commercial seed sales in 2006/7.

As table 4.6 shows, however, overall impacts of the subsidy programme on input sales depend not only on displacement effects but also on the impact of participation or exclusion in the programme on subsidy sales and on customers visiting the outlet. The last two lines of the table identify the status of agrodealers and retail outlets for larger companies as regards subsidised fertiliser and seed sales. In this regard it is noticeable that both reported a significant increase in sales in 2006/7 when they were able to participate in subsidised seed sales and (only retail outlets for larger companies) in subsidised fertiliser sales (Kelly et al., 2010). Conversely the exclusion of private sector companies from all retail subsidy sales in 2005/6 led to substantial falls in reported fertiliser sales from all retail outlets. Sales recovered in 2006/7 and 2007/8 for the larger importers with retail outlets, with their inclusion in retail subsidy sales, but they again suffered falls in retail outlet fertiliser sales with their exclusion from the programme in 2008/9 (Kelly et al, 2010). Small agrodealers have been excluded from retail sales of fertiliser subsidies in all four years of the programme.

d. Maize market impacts

The input subsidy programme may affect maize markets in a number of ways. We identify four types of potential impact.

- direct impact through increased supply of maize for sale and reduced demand for purchases by net surplus and deficit farmers.
- indirect impacts as a result of policy changes influenced by the subsidy.
- in the longer term, if the subsidy programme leads to rising incomes then there should be a change in demand for maize as a result of both increased direct consumption of maize and increased consumption of livestock that themselves consume maize.
- Finally, if the net effects of the above types of impact is to lower (or raise) maize prices, then we would expect some supply response to increase (or reduce) land and other resources allocated to maize production.

These impacts arise in the context of wider changes in production (as a result of seasonal weather), in policies, in regional and national maize markets, and in urban and rural incomes (as a result of other processes of livelihood change and growth).

Data and analytical difficulties make it difficult to tease out these different influences, but Malawi is fortunate to have good information on maize prices. As noted earlier, prices have varied widely in the past, and, as shown in figure 4.2, variability has continued in the period of subsidy implementation – indeed maize prices reached historical highs in early 2009[24].

[23] 2007/8 is assumed to have similar displacement to 2006/7 (higher subsidy sales may increase displacement but greater farmer familiarity and higher fertiliser prices would be expected to reduce displacement). A lower displacement is assumed for 2008/9 as a result of much higher fertiliser prices and earlier (separate) beneficiary registration.

[24] Maize prices are simple averages across all markets surveyed weekly by the MoAFS, deflated to 1990 prices.

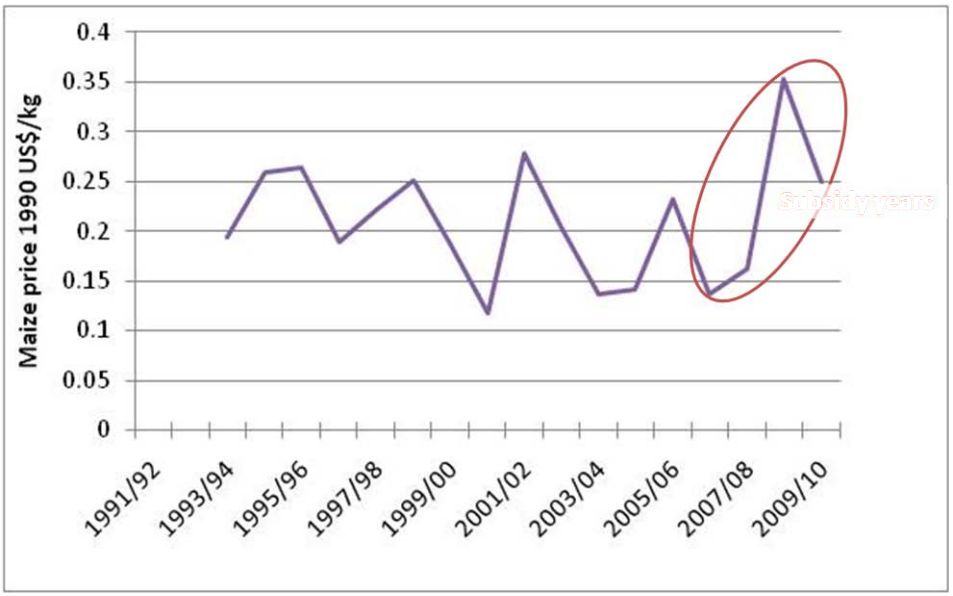

Figure 4.2 Mean annual maize prices by marketing season

These high prices should not be expected given the large maize production estimates in each subsidy year – indeed low prices would be expected.[25] Low prices were observed in the 2006/7 marketing season (following the 2005/6 subsidy) and initially in 2007/8 (following the 2006 /7subsidy). In the latter year, however, although substantially larger estimated production as compared with the previous year should have led to lower prices, prices rose towards the end of the season, so that maximum monthly price within the year was high. This led to higher prices than in the previous year. Prices following the 2007/8 subsidy were even higher, with average annual price exceeding those of the 2001/2 and 2005/6 famine years[26], but these high prices did not lead to any reports of widespread suffering and distress such as experienced in those previous years with equivalent high prices.. Prices in the first half of the 2009/10 season (following the 2008/9 subsidy) are considerably lower than the previous year, but given the estimated production are still very high by historical standards. How can this pattern of prices and estimated production be explained?

A number of explanations are put forward:

- In 2007/8 roughly 330,000MT of maize was exported, and in 2009/10 130,000 MT has been purchased by government for the strategic grain reserve (SGR), and a further 100,000 MT is estimated to have been bought and held in storage by private traders (FEWSNet, 2009). Exports and purchases of stocks to carry-over to the following season would reduce maize volumes (this would not be the case for 2009/10 SGR and other stock purchases subsequently sold later in the 2009/10 season). The effect of this on figure 4.3 would be to shift the 2006/7 and 2008/9 subsidy figures to the left by around 300,000 MT and 100,000 MT respectively[27]. This does not, however, bring the three later subsidy years anywhere near the pattern of the 1993/4, 1995/96 to 2004/5 and 2006/7 seasons. Indeed, there are reports of maize imports of roughly 50,000 tons from Mozambique and 36,000 tons from South Africa during the 2008/9 market period (FEWSNet, 2009, South African Revenue Authority, 2009).

[25] Low average prices in some of the early 90s are affected by large scale imports, and at the turn of the century by the starter pack subsidy programme (with good weather).

[26] The annual average price in 2008/9 was very high although peak prices were equivalent to those in 2001/2 and 2005/6, because prices rose much earlier in the season in 2008/9, but then flattened out.

[27] The latter may be higher if there are significant exports or commercial carry over stocks at the end of the season.

- Rising real incomes with falling poverty rates (discussed later) and rising population may all lead to rising national demand, and this would cause the 1995/96 to 2004/5 pattern to drift to the right over time – but not as suddenly and dramatically as shown in figure 4.3. It is, however, compatible with the lack of distress in later years despite high prices.
- Storage losses may be rising as a result of increasing production of hybrid maize promoted by the 2006/7 and subsequent subsidy programmes. However the preliminary results from a 2009 household survey suggest that storage losses are not particularly high, with 50% of respondents reporting no losses in the 2007/8 and 2008/9 storage years, and only a little over 20% reporting high losses. Mangisoni (2010) also reports relatively low storage losses in the range of 12% over a 10-month period.
- Higher welfare and real incomes following the 2005/6 harvest and low maize prices leading to greater retention and consumption of the 2006/7 harvest and hence a thinner and tighter market.
- Changes in informal cross border flows (see Jayne et al, 2010).
- Over-estimates of national maize production following the implementation of the subsidy programme. Although there are no clear changes in methodology in the last few years, the method appears to substantially rely on field workers' subjective estimates of crop area and yield, and that these may be affected by the very substantial involvement of field workers in the subsidy programme. Production impacts of the subsidy programme are discussed in more detail below.

None of these explanations (except possibly the last) can fully explain the high prices despite the high estimated production following the 2006/7, 2007/8 and 2008/9 subsidy programmes. To illustrate this, figure 4.3 below plots maximum monthly price against estimated per capita net maize supply . From the 1993/94 to 2004/5 production seasons we see a roughly downward sloping relationship with high prices following years of low supply , and low prices in years following high supply (although the 2002/3 and 2003/4 seasons do not fit this relationship) . Prices following the first (2005/6) subsidy fit into this pattern. The three subsequent seasons do not however fit into this pattern, showing high prices despite high estimates of production.

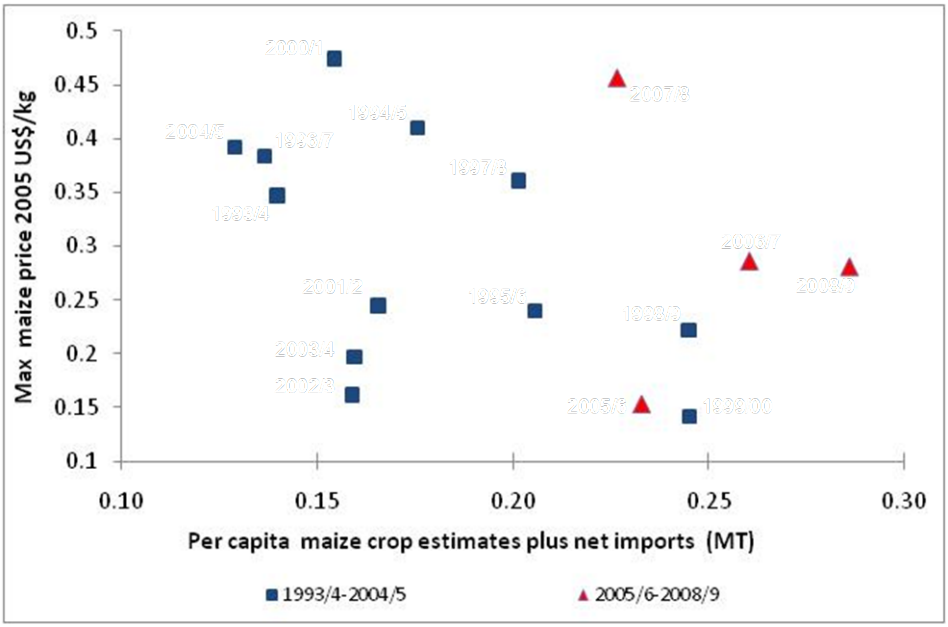

Figure 4.3 Peak monthly maize prices by estimated maize supply per capita by season

Estimated maize supply = crop estimate plus exports – imports. Calculated from MoAFS annual crop production estimates and weekly maize price data, Jayne et al, 2010 and Minot, 2009, from FAO, 2009.Labels show production season.

Two clear and important conclusions emerge from this analysis. First, in three out of four years the subsidy programme has not led to lower market prices for maize. Second, the subsidy programme has not led to increases in maize supply as large as those suggested by increases in maize crop estimates from 2006/7 onwards and particularly in 2007/8 and 2008/9, when prices appear to be very high when compared with estimated supplies. We therefore now turn to consider estimates of the subsidy programmes impacts on production.

e. Production 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. This 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.

Estimated incremental fertiliser sales were discussed earlier in terms of the effects of displacement on input supply markets. Incremental fertiliser sales are also important for estimating the incremental production effects of the programme, with responses to fertiliser depending upon rainfall, crop variety, and management (including timing of planting, weeding, and timing and methods of fertiliser application), and soil fertility.

Table 4.7 Estimated incremental fertiliser sales and maize production, 2005/6 to 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.

SOAS (2008) and Dorward and Chirwa (2009) calculate estimated incremental production for 2005/6 to 2007/8 using a range of fertiliser responses to maize from 12 to 18 kg grain per kg of N. Results from crop cutting survey estimates in the 2008/9 crop year demonstrate that substantial difficulties

in obtaining precise estimates of crop responses[28] make it difficult to obtain precise estimates of incremental production from the subsidy programme, but support the broad range of 12 to 18 kg grain per kg of N with 15kg/ha a reasonable 'medium expectation'. Using different estimates of incremental fertiliser use and of yield responses gives different estimates of incremental production as a result of the input subsidy programme. Table 4.7 sets out such estimates by year of implementation.

For each year estimated incremental fertiliser use is multiplied by a grain to nitrogen response ratio adjusted to reflect differing conditions in subsidy implementation between years (good weather but very little hybrid seed in 2005/6 as compared with 2008/9; similar conditions in 2006/7 but a bit less hybrid seed ; late fertiliser delivery in the southern region and only slightly more hybrid seed in 2007/8). This is added to a yield gain from subsidised hybrid seed separate from fertiliser to give an estimate of total incremental maize production from the subsidy[29]. High and low estimates are respectively 20% above and below the 2008/9 medium estimate (which averaged 15kg grain/kg N across hybrid and local seed plots).

The estimates in table 4.7 are necessarily approximate, indeed indicative, as noted above, but nevertheless demonstrate some important points :

a. Incremental production is very sensitive to yield responses to inputs (hybrid seed and fertilisers) and there is therefore considerable potential for raising yields and yield responses with good subsidy programme and crop management – with early subsidy sales, planting and fertiliser application, with high plant populations, and with greater use of organic matter for example.
b. Not explicitly shown in table 4.7 is the importance of hybrid seed in raising yield responses to fertiliser. Increasing sales (subsidised or unsubsidised) are therefore another potential way of increasing subsidy impacts on incremental production[30].
c. Incremental production estimates are considerable, and they grow over the life of the programme as a result of increasing volume of incremental fertiliser use and increasing supply of hybrid seed.
d. Incremental production estimates are, however, considerably less than the production increases estimated in the national crop estimates for maize production since the start of the subsidy programme. – and these differences are too large to be explained by upward revision of the yield response to fertiliser[31].
e. Differences between pre-subsidy and subsidy years' production as estimated above are more compatible with price differences between these years as shown in figures 4.3 and 4.4 (for example the export of 330,000 MT following the 2006/7 harvest would more than cancel out the increased subsidy impact that year as compared with 2005/6). The very high prices in 2007/8 remain a puzzle but may be explained by the subsidy programme incremental production being insufficient to counteract production losses from adverse conditions affecting all maize in some parts of the country (with late subsidised input delivery and with local events such as flooding and drought spells).

[28] These include inherent and difficult to quantify biases in different methods of collecting yield data, multi-collinearity between input use and other management variables, high variability in smallholder agriculture, and variation of response rates with average rates of subsidised fertiliser use.

[29] This calculation looks only at maize production. Provision of fertiliser subsidy for tobacco leads to much higher displacement than on maize, so assuming that all incremental fertiliser is used on maize is not unreasonable. Fertiliser impacts on crops mixed with maize is ignored here.

[30] It is important to note that this may not require increased hybrid seed subsidies if farmers are able and willing to purchase unsubsidised seed – improved access to seed, increased distributors, and effective extension *may* be more effective in this.

[31] For 2007/8, however, lower crop estimate due to local droughts and floods affected total production not just incremental production from the subsidy.

f. Macroeconomic impacts

The large size of the programme could be expected to have macro-economic impacts. As a proportion of total government expenditure the subsidy increased from 5.6% in 2005/06 to 8.4% in 2006/07 and 8.9% in 2007/08. With very large increases in fertiliser prices and costs for 2008/09 actual expenditure on the subsidy rose to more than 16% of total government expenditure (see table 4.4). As a proportion of GDP, subsidy programme costs rose from 2.1% in 2005/06 to 3.4% in 2007/08 and to 6.6% in 2008/09 (excluding remittance by ADMARC and SFFRFM of the farmer's redemption price to government).

On the positive side, estimates of GDP growth have been significantly impacted by the significant increases in estimated maize production since the implementation of the subsidy. Estimates of incremental production due to the subsidy programme are lower (see later discussion), but are nevertheless very large, and incremental maize production and increases in land and labour productivity in maize production due to the programme should have had a significant positive impact on GDP growth.

There was no evidence of the subsidy having negative macroeconomic impacts in its first two years (SOAS et al, 2008). Important contributors to this were sound macro-economic management, improving macro-economic indicators (growth, inflation and government deficit, see table 4.8) and wider growth in the economy being achieved at that time – with the subsidy itself being a contributor to that growth (good tobacco prices, good weather for agricultural production and improved macro-economic management and conditions being other important contributors). Improved macro-economic management, together with budgetary support from donors, was also undoubtedly important in allowing the government to finance such a large programme.

Table 4.8 Trends in Macroeconomic Performance Indicators, 2005 – 2009 (%)

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

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

The situation was, however, changing, as increasing volumes and increasing prices in subsequent years lead to very high cost overruns, as discussed earlier. At the same time the economy faced a number of internal and external macro-economic pressures which led to adverse changes in macro-economic indicators. Again the subsidy programme both contributed to and was affected by macroeconomic changes, this time adversely (other macroeconomic pressures alongside very high government expenditure and import costs for the subsidy programme were high fuel costs, high maize prices, other government expenditures, and lower tobacco prices) although the incremental maize production from the subsidy programme should have exerted a downward influence on maize prices. These various pressures, with government commitment to a fixed exchange rate against the US$, contributed to a foreign exchange crisis experienced in November/ December 2009.

Very high budgetary and foreign exchange allocations to the subsidy programme also reduce funding available to other activities such as health, education and infrastructural development.

It is clear that this level of spending is not sustainable and the government is addressing this. 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, recognising that displacement rates are higher and returns to government investment lower for subsidies on inputs for tobacco and other cash crops.

g. Economic impacts

The economic returns to the programme depend upon the economic price of maize, the price of inputs, and production responses to increased input use. Benefit : cost ratios estimated for the 2006/7 programme showed that the net economic return to the project is very sensitive to maize prices and the production response, and with reasonable variation in assumptions could range from 0.76 to 1.36 with a mid estimate of 1.06 (see table 4.9). Adjustments to this analysis using estimated maize and fertiliser prices for other programme years suggest that both the 2005/6 and 2007/8 programmes should have yielded equivalent or higher returns. However the very high fertiliser prices that prevailed when fertilisers were being purchased for the 2008/9 programme adversely affected returns in 2008/9, despite good weather and yields and high maize prices (although these did offset the effects of high fertiliser prices to some extent).

Table 4.9 Estimated Economic Impacts of 2005/6 to 2008/9 Subsidy Programmes

	2005/6		2006/7		2007/8		2008/9	
Domestic maize prices (US$/mt)	May-Oct06	Nov06-Apr07	May-Oct07	Nov07-Apr08	May-Oct08	Nov08-Apr09	May-Oct09	Nov09-Apr09
	139.5	142.7	119.3	243.8	336.6	434.6	271.4	307.1
Maize price in BC & fiscal efficiency analysis (US$/mt)	143		154		250		280	
Fertiliser price in analysis (US$/mt)	393		490		590		1,250	
Benefit cost ratio: high response	1.38		1.30		1.90		1.08	
Benefit cost ratio: moderate	1.12		1.06		1.54		0.90	
Benefit cost ratio: low response	0.86		0.81		1.18		0.72	
Fiscal efficiency: high response	0.76		0.44		1.13		0.09	
Fiscal efficiency: moderate	0.24		0.09		0.68		negative	
Fiscal efficiency: low response	negative		negative		0.23		Negative	
	2005		2006		2007		2008	
Poverty incidence	50%		45%		40%		40%	
Meals per day	2.0		2.2		2.3		2.3	

Notes:

Benefit cost ratio and fiscal efficiencies calculated with high, medium and low fertiliser responses of 18, 15 and 12 kg grain /kg N respectively.

Benefit cost ratio: Gross incremental benefits divided by gross incremental cost, valued at social prices.

Fiscal efficiency: net economic benefit divided by fiscal cost.

Sources: SOAS et al (2008), Dorward et al (2010b), FNSP M&E 6th report (draft), NSO WMS reports.

Fiscal efficiency estimates (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).

The key conclusions from the benefit cost and fiscal efficiency analysis are that

(a) economic returns are highly sensitive to the yield response to fertiliser (as discussed earlier under production impacts),

(b) fiscal returns are highly sensitive to displacement rates, and

(c) with good programme implementation and good (but achievable) yield responses to fertiliser the programme can be a very good investment.

It is therefore critical that programme design and implementation deliver low displacement and high responses to inputs.

h. Growth and poverty reduction impacts

While economic cost benefit and fiscal efficiency analysis can yield valuable information about programme efficiency, they can be misleading when examining the contributions of the programme to poverty reduction, growth and food security. Understanding the full economic benefits of the programme requires consideration of the direct effects of the programme on subsidy recipients and then of the different ways that these effects subsequently work through their own and others' livelihoods and the rural economy. It is very important that for such a large programme the wider markets effects of the intervention are properly recognised.

Figure 4.4 shows three possible uses of the subsidy by subsidy recipients: reselling of coupons or of subsidized inputs, incremental use of the inputs in production, or use of the inputs with displacement of purchase of unsubsidised inputs . These should lead to two main types of direct benefit for recipients: immediate income transfers (from reselling of coupons or subsidised inputs or from reduced expenditure on inputs as a result of displacement of unsubsidized purchases by cheaper, subsidised purchases), or incremental production at harvest if the inputs are used on farm. If poorer households sell their coupon(s) then immediate income and welfare gains should also be accompanied by an easing of short term seasonal cash constraints. This may reduce the extent to which they have to hire out casual 'ganyu' labour to obtain food, and thus allow them to work more on their farms, both increasing end of seasons yields and reducing the supply of labour into the local labour market. At the same time if less poor households obtain cheaper inputs directly from the programme or buy it from subsidy recipients, then this increase in income should increase their demand for hired on farm labour or for local goods and services. The result should be a tightening of both demand and supply in the local labour market, and a consequent rise in wages, to the benefit of poorer households.

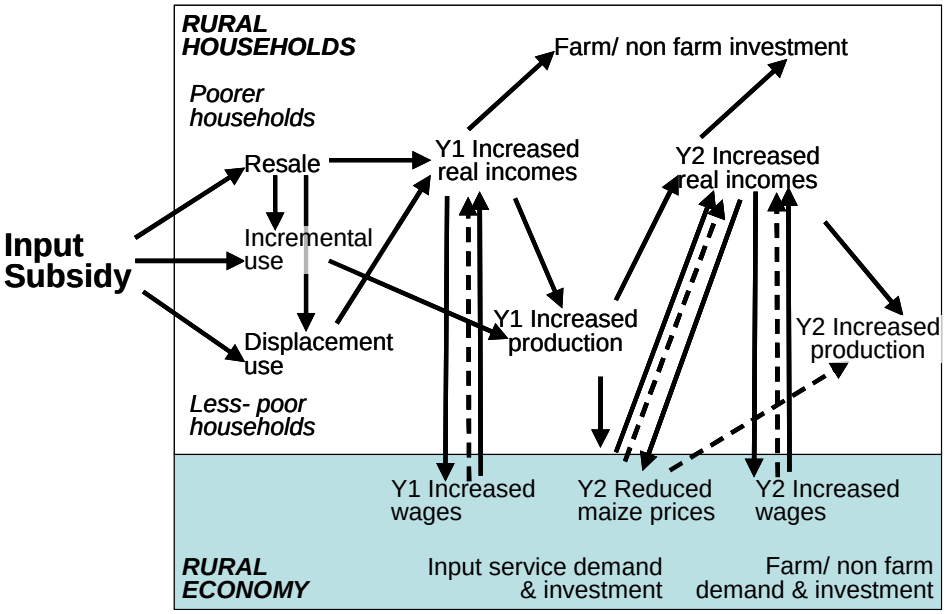

Figure 4.4 Tracing out direct and indirect subsidy impacts

Note: Solid lines indicate positive impacts for poorer, food deficit producers and sellers of labour; dashed lines indicate negative impacts for the less poor, maize surplus producers and buyers of labour.

Further direct and indirect benefits may also accrue in subsequent seasons. At the end of the season, higher maize production should result from incremental fertiliser use and increased crop labour inputs, increasing households' incomes. This should also depress maize prices. Higher household maize stocks and lower maize prices carried forward into the following season should again benefit

poorer households, reducing their seasonal cash flow constraints and their need to hire out labour, so that they can again work more on their own farms. This will again tighten the labour market. Higher incomes from higher wages should stimulate demand for non farm goods and services, with spin-off benefits and multipliers in the local economy.

There is considerable empirical support from Asia and from Africa for the importance of some of these processes and of indirect effects of agricultural growth on wider economic growth. Hazell and Rosegrant (2000) show that the indirect effects of increased agricultural production in the green revolution in Asia were the major process by driving pro-poor growth in the second half of the 20th century. There is also a large literature on agricultural growth 'multipliers' in Africa with estimates that vary from around 1.5 to over 2.0 (Hazell and Hojjati (1995), Reardon (1998), Delgado et al (1998)) [32]. Studies across Africa and Asia generally also show that consumption linkages are more important than production linkages, accounting for between 50% (in Senegal) and 98% (in Zambia) of overall multipliers calculated (Delgado et al (1998). These studies do not, however, explicitly consider the further effects of transfers and growth on seasonal capital constraints, and the knock on effects of relaxing these.

The extent of these effects and of direct and indirect increases in wages and benefits to poorer households in this process in Malawi with the subsidy programme is, however, an empirical question, as is the extent to which productivity and welfare benefits are carried forward from one year to the next. Focus group discussions in 2007, reporting on the effects of the 2005.6 subsidy, clearly (and independently) articulated processes of easing of seasonal cash constraints in the hungry gap and tightening of labour markets, with higher wages and low maize prices throughout the season (SOAS, 2008). Similar focus group discussions conducted in 2009 reported income benefits from higher wages and increased maize availability, but were also concerned about the adverse effects of high maize prices – and the high maize prices experienced after 2006/7 would be expected to undermine these processes.

Livelihood and rural economy models have also been used to investigate and describe this process in 2006/7 (see SOAS 2008) and for 2008/9 (Dorward, 2010). These provide results consistent with focus group discussion reports, with the subsidy contributing to higher wages but with lower wage effects in 2008/9 and with subsidy benefits becoming more concentrated among beneficiaries (as the value of direct production benefits to subsidy recipients are increased with higher maize prices, but the benefits of lower maize prices and higher wage to poor non-beneficiaries are absent or reduced). Fragmented information on wage rates over the period 2005/6 to 2008/9 suggests that wage rate increases over the period were higher than maize price increases over the same period, representing real increases in wage rates.

Further empirical work is required to investigate the scale of the indirect benefits through wage effects, as they depend heavily upon the scale of growth multipliers indicated earlier (consumption multipliers of a little over 1.5 embedded in the livelihood and rural economy models are derived from historical expenditure patterns in Malawi, and these are augmented by savings multipliers in the model). Without these multipliers wage impacts would be very low, as agricultural wage labour constitutes less than 20% of household income even among the poorest 20% of rural households in Malawi (AISS survey data), although observed rises in agricultural wages would suggest that unskilled non-agricultural wages have also risen, unless these two labour markets are completely separated – which would appear unlikely.

The overall increase in real wages over the period is supported by anecdotal reports of rising rural wages and is consistent with limited political and social impact of and response to the high nominal maize prices in early 2009. It is also consistent with reports of falling poverty rates and wasting among under fives (see table 4.8). The subsidy programme is not the only contributor to these improvements. Over the same period there were good rains, a marked improvement in macro-

[32] A multiplier of 1.5 indicates that $1.00 of extra income from agricultural production stimulates further income growth of $0.5.

economic management, and good tobacco prices. These will have made direct contributions to economic growth, and also facilitated the implementation and impact of the subsidy programme (the tobacco prices and macro-economic management will have contributed to forex availability for fertiliser imports, reduced crowding out effects of the programme, and stimulated other complementary parts of the economy; yield responses to fertilisers would have been reduced without good rains).

Attribution of these changes to the programme is difficult, but there are some reasons for thinking that the stimulus to maize production from the subsidy and the good rains has been a critical and major element in rural growth and poverty reduction, as compared with the effects of good tobacco prices alone. There is limited evidence from elsewhere in Africa and the world that even labour demanding smallholder cash crops can drive pro-poor growth in such a broad way.

Further empirical work is also needed to establish the extent to which productivity and welfare gains in one year are carried forward to subsequent years, the conditions under which these gains can be maximised, and the implications of this for programme design and implementation and questions about graduation.

4. Conclusions and lessons

This paper suggests that the Malawi agricultural input subsidy programme has achieved substantial benefits and successes although these are more nuanced than some of the headline press reports on the programme may suggest, and that the measured benefits of the program relative to the costs have been relatively modest. However, our benefit-cost analysis does not capture all the benefits of the programme. Moreover, there is continuing scope for considerable improvements in programme effectiveness and efficiency, although there are also practical and political difficulties regarding the implementation of some of these and questions about their effects.

Other African countries considering the introduction of agricultural input subsidies can learn important lessons from Malawi's experience . The programme is a bold and very large scale initiative that has achieved substantial increases in maize production. The implementation of such a programme represents a very considerable logistical achievement, and the government is to be commended for this and for its continuing and often imaginative attempts to improve the programme. Nevertheless, higher maize prices and calculation of the agronomic yield effects of incremental fertiliser and seed suggest the production increases resulting from the programme are not as large as might appear from the post 2005/6 national maize production increases reported in MoAFS crop estimates. While the food security and growth benefits of the programme have been partially undermined by high maize prices, there have still been significant improvements in productivity and welfare from 2005/6 associated with greater maize availability and with increases in real wages.

Ongoing challenges that the government is working on in programme implementation include cost control, timing of input deliveries, effective targeting of subsidised inputs, reducing diversion and fraud, improving agronomic and market returns with complementary investments (for example in extension, research, organic soil fertility improvement, and in roads), and using the subsidy programme to extend private sector input delivery systems. Success in addressing these challenges will lead to new challenges as increasing success will lead to changes in the need for such a large scale programme with these objectives – and continuing political, strategic, economic, technical and logistical system innovations will be needed to respond to these changes.

Malawi's experience with its large scale agricultural input subsidy programme offers a number of important lessons to other countries in Africa considering the introduction of agricultural input subsidies.

First, any growth and development strategy that involves agricultural input subsidies must be rooted in the opportunities for and constraints to growth and development facing a country and particular groups within it. This paper has set out in some detail specific difficulties that constrain broad based growth in Malawi – highlighting the reliance on low productivity maize and the difficulties and

limited options faced by very large numbers of poor food deficit farmers, and indeed by the Malawian economy as a whole, in breaking out of the low maize productivity poverty trap.

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. Malawi's key achievements with its subsidy programme have been its ability to raise land and labour productivity and improve food security for large numbers of poor households by relieving both profitability and affordability constraints on use of inputs to increase staple crop productivity – and this involves some combination of increased real wages and reduced food prices. The Malawian model will therefore only potentially apply to other countries if there are large numbers of people facing similar staple food productivity constraints with increased input use constrained by thin input markets, poorly developed input supply systems, and widespread profitability and affordability problems.

This paper has argued that the Malawi experience shows that, in the right context, large scale agricultural input subsidy programmes have the potential to yield substantial benefits to people and their governments with good design and implementation.

The paper has also showed the very substantial costs and resources required for such programmes, and the difficulties and challenges that must be overcome if they are to yield the benefits that are expected and required for them to be effective, efficient and sustainable. The following issues are drawn to the attention of those considering the application of Malawi's experience to other countries:

- *Focus*: subsidies should be provided for inputs whose use for important staple crops is constrained by affordability difficulties despite high potential responses to input use.
- *Consumer gains*: strong emphasis should be put on wider contributions to economic growth and poverty reduction through consumer as well as producer gains
- *Scale*: the subsidy should affect staple crop prices and/or labour markets, and this requires sufficient local or national scale to affect markets, but strict limits on scale and the control of costs are needed to limit displacement of existing purchases, crowding out of critical complementary investments, and adverse macro-economic impacts
- *Logistical systems* face major challenges in delivering timely, targeted subsidies to large numbers of dispersed farmers, and the establishments of such systems requires time and major investments.
- *Performance monitoring, information and audit systems* are needed for developing trust, controlling fraud, and promoting efficiency and effectiveness. Debates on crop production estimates and the number of farm families in Malawi also demonstrate the importance of reliable information on much larger issues beyond specific matters concerned with the implementation of the programme.
- *Effective targeting and rationing systems* are needed to limit scale and increase subsidy impacts on productivity, but different (geographical or household) approaches face different costs and difficulties (Dorward 2009), and in some situations strict rationing of universal provision may be a practicable alternative.
- *Entitlement systems* are needed for targeting and rationing, and these need to be robust against inevitable counterfeiting and diversion.
- *Input supply system development* needs close attention to the complementary and changing roles and interests of different public sector and commercial stakeholders, but improved farmer access to input services should be a major objective and outcome from agricultural input subsidy programmes.
- *Complementary policies and investments*: If a subsidy programme is seen as part of a wide and long term strategy for poverty reduction and economic development then investments in complementary activities must be made in, for example, extension, research, organic soil fertility improvement, health, education, and market, transport and communications

infrastructure and services. Consideration of the different roles of these complementary investments should also guide decisions on the nature, scale and implementation of the input subsidy as well as of other investments, to achieve important interactions between these investments.

- *Macroeconomic management* is also important, to promote favourable growth conditions and provide budgetary resources needed for such a programme
- *Political commitment* is required for sustained mobilisation of programme resources, but there may also be potential conflicts between the need for political support on the one hand and targeting, rationing, cost control, and performance monitoring needed for efficient and sustainable implementation on the other
- *Sustainability* of programme implementation should be addressed by attention to cost control, scale, and logistical and performance monitoring and audit systems discussed above. There is also need for investigation of sustainability of impacts, with examination of the extent of carry forward of productivity and welfare gains between years and the implications of this for programme design and implementation and for questions about 'graduation'.

We conclude by noting a dilemma in the design and implementation of large scale subsidy programmes, in that they need both stability and flexibility, with innovation. Stability is needed to provide stakeholders with confidence and security that will justify long term financial and other investments associated with the programme's implementation. However this can be undermined by the need for flexibility to adjust to changing conditions (for example in the weather, in international and national markets and economies, or in politics), and some of these changes may be anticipated or unanticipated results of the programme. Alongside flexibility is the need for innovation (in technology, in systems, in prices) to take advantage of learning and change during programme implementation. Although flexibility and innovation can undermine stability, lack of flexibility and innovation may also undermine stability (if conditions, for example growing fraud) make the system unsustainable and ineffectiveness in its initial form. In order to achieve mutually supportive stability, flexibility and innovation there must be trust and 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.

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