TABLE 9.6

Key features of reviewed input subsidy programmes

		Ghana	Zambia FSP	Kenya NAAIP	Malawi AISP	Malawi TIP	Malawi Starter Pack	Sasakawa Global 2000 (Ethiopia)	Millennium Villages (Malawi, Kenya)	Malawi SPLIFA	Nigeria: DAIMINA
	Year	Jul-Dec 2008	2002 onwards	2007 onwards	2005/6 onwards	2000/1-2004/5	1998/9-1999/2000		2006/7 onwards	2003/4 - 2004/5	2004
	Source(s)		Minde et al (2009)	Sikobe (2008)	SOAS et al (2008)	Levy (2002, 2005)	Levy (2002, 2005)	Crawford et al (2006)	Buse et al (2008)	Gregory (2009)	Gregory (2009)
Stated Objectives											
1	Wider (pro-poor) economic growth							long run aspiration	long run aspiration		
2	Consumer benefits (lower output prices, access)										
3	National / household food self sufficiency / security	yes	latterly - increased maize production	hh food security/ availability	yes	targeted hh		long run	hh /village food security	hh food security	
4	Input adoption	yes	initially remote smallholders	yes	remote capital constrained farmers		yes	Yes	yes		
5	Input use efficiency			yes				Yes			
6	Addressing the price productivity tightrope										
7	Producer welfare (emphasis on poorer producers?)	yes (not apparent)	yes (not apparent)	yes	stated in later years	food insecure producers	food insecure producers	Yes	yes	food insecure producers	yes
8	Input supply system development & efficiency		yes	yes		increasingly recognised				yes	yes
9	Soil fertility replenishment								??		
10	Political benefits (not stated)	yes	yes	yes	yes	yes	yes				

TABLE 9.6

Key features of reviewed input subsidy programmes (continued)

		Ghana	Zambia FSP	Kenya NAAIP	Malawi AISP	Malawi TIP	Malawi Starter Pack	Sasakawa Global 2000 (Ethiopia)	Millennium Villages (Malawi, Kenya)	Malawi SPLIFA	Nigeria: DAIMINA
Design & implementation											
1	Basic subsidy system (focus & direct recipients)	producers	producers, but significant supplier capture	producers, agro-dealers	producers	subsistence producers	subsistence producers	Producers	subsistence producers	subsistence producers & suppliers	producer (25%) & supplier (50% 60 day trade credit, training)
2	Product focus – staple foods, cash crops, etc?	staples intended but wide use	Staples	staples	mainly staples	staples	staples	Staples	staples	staples	
3	Scale?	national scale	National	36000 hh (2007) plan 2.5 million farmers	national programme, >1.5 million hh	targeted 25%+ hh	universal	max 650,000 farmers	project villages	100,000 hh	pilot
4	Subsidy / beneficiary?	50% costs	50% costs	100% on inputs for approx 0.4ha	60 to 90% on inputs for approx 0.4ha	100% on inputs for approx 0.08ha	100% on inputs for approx 0.1ha		100% on inputs for approx 0.4ha	100% on inputs for approx 0.4ha	25% subsidy on cash purchases
5	Volume subsidised?	30,000 tons of fertilizer, US$15 million	66,000mt average pa	plan 250,000mt fertiliser	130 to 220,000 tonnes fertiliser, US$50-200 million,	11,000 to 50,000 tonnes fertiliser	42,000 to 44,000 tonnes fertiliser				385 mt fertiliser
6	Voucher or other entitlement systems, distribution & input access systems	vouchers	subsidised sales by cooperatives	vouchers	vouchers	physical distribution initially, moved to vouchers	physical distribution initially, moved to vouchers	physical distribution	physical distribution?	vouchers for work	vouchers
7	Targeting – objectives, criteria and methods	None	farmers with 1 to 5 ha (less poor 60%)	resource poor with land; disadvantaged; potential group members	poorer productive farmers (highly variable in practice)	ineffective targeting of poor / vulnerable farmers	universal	more (potentially) productive farmers in more productive areas	geographical (site selection)	self / community targeting, food insecure	
8	Rationing	intended fixed quantity / hhold, not consistently enforced		fixed quantity per farm hh	fixed quantity per farm hh	fixed quantity per farm hh	fixed quantity per farm hh	fixed quantity per farm hh	fixed quantity per farm hh	fixed quantity per farm hh	
9	Input supply systems	Importer supply system	cooperatives supplied by private imports	private retailers/ agrodealers	mixed, mainly parastatal & large private importers / retailers	mixed, mainly private importers	mixed, mainly private importers	mixed - including part government owned importers/ distributors		small agrodealers, supplies arranged by IFDC	small agrodealers , 50% trade credit
10	Secondary market and leakage policies	formally prohibited			prohibited	prohibited	prohibited				
11	Complementary integration & investments & policies	no		extension, cereal banks, group work (planned)	some subsidised legume seed but supply shortages			credit, extension, floor prices	extension, health, education, community development	agrodealer extension training, road construction	

TABLE 9.6
Key features of reviewed input subsidy programmes (continued)

		Ghana	Zambia FSP	Kenya NAAIP	Malawi AISP	Malawi TIP	Malawi Starter Pack	Sasakawa Global 2000 (Ethiopia)	Millennium Villages (Malawi, Kenya)	Malawi SPLIFA	Nigeria: DAIMINA
	Outcomes										
1	Timing	voucher issues July to Oct, late in south	70% ok	n/a	last minute and later than optimum input delivery, has improved	sometimes last minute/ late	sometimes later than optimum input delivery	generally good though lower costs if earlier	good	late input deliveries	improved timeliness
2	Internal monitoring & audit systems	not reported	not reported	M&E planned	internal M&E, limited audit systems	independent & internal M&E	independent & internal M&E	some evaluation Howard et al 1999	yes	dealer & farmer surveys	dealer & farmer surveys
3	Input leakage, displacement	some leakage to other crops	substantial - ? 70% leakage in 2007/8, 40% displacement		limited leakage info, displacement with less poor beneficiaries & cash crop use: 20-40%	low displacement estimates	limited leakage info, low displacement estimates			limited; monitoring & transparency / accountability in community	
4	Incremental input use	in regions with timely delivery	variable - 60% if reaches smallholders?		60-80% for fertilisers, unknown for seeds	no specific estimates	no specific estimates	Yes	substantial incremental input use reported	yes	Yes
5	Incremental production		Yes - but could be more		approx 30-40% maize production increase?	40 - 350,000 mt maize?	350- 500,000mt maize?	Yes	substantial reported	yes, but poor weather& late deliveries	Yes
6	Increased productivity		Some		as above	40 to 125kg maize /hh	170 kg maize /hh	Yes	substantial incremental land & hh productivity reported	yes, see above	
7	Output price changes (producer & consumer prices)		modified by marketing policies		low prices only after 2005/6, modified by marketing policies	very limited - some high price years	Yes, also with good rains	large price fall led to credit defaults			
8	Unsubsidised input price changes		No		No	reduction in import costs / margins during implementation					
9	Labour market changes (hired labour demand, wages)				following 2005/6 subsidy					yes (limited scale)	
10	Programme cost / benefit analysis (fiscal, economic)		C:B ratio >=1.07		potential to be >1 depending on yield gains & input & output prices. Fiscal efficiency depends on displacement rates	range of food security benefits and savings of emergency imports		Economic CBA >1 if extra production reduces imports, but not for export. Doubtful in less favourable areas			
11	Welfare and growth impacts				productivity gain benefits but often consumer losses from higher maize prices	limited social protection, divisive targeting	lower maize prices		improved hh welfare reported	improved beneficiary food security (less for female headed hh),improved roads	
12	Macro economic effects				significant budget impacts in 2008/9	limited	limited	Limited	none	none	none
13	Input supply system impacts	negative except large importers	Negative		importers gain, agrodeales excluded from fertiliser supply, instability gives limited sustainable gains	private input suppliers (fertiliser importers, seed companies, retailers and agro dealers) grew during starter pack & TIP implementation		some crowding out of credit systems & independent distributors & retailers		increased trust from customers, dealer business benefits	expanded farmer demand, dealer profits, turnover & system sustainability
14	Soil fertility improved										

'targeted input programme' (TIP) with a smaller quantity of fertiliser (10kg) per beneficiary and targeted selection of beneficiaries. With poor rains and later delivery of inputs in some years, national production was very low with severe food shortages in 2001/2 and 2005/6 – and consequent large scale expansion of the number of TIP beneficiaries in these years. From 2005/6, however, the government has taken a different approach with a very large scale programme (the Agricultural Input Subsidy Programme or AISP) providing about 50% of farm households with vouchers for 100kg of fertiliser and small quantities of maize (and latterly legume) seed, with mainly privately imported fertilisers delivered principally, and in some years exclusively, by two parastatal input suppliers. Levy and Barahona (2002) and Levy (2005) report extensively on the TIP and its predecessor the starter pack programme, while SOAS (2008) and Dorward and Chirwa (2009) review the (ongoing) AISP and have estimated positive returns to the 2006/7 programme depending upon prices, and implementation effectiveness and efficiency, with potential for very large returns or losses. Dorward et al (2008) provide historical and political context to these programmes.

9.3.1.5 Sasakawa global 2000

During the 1990s the Sasakawa Global 2000 implemented a number of projects in different African countries under which farmers were given assistance in acquiring inputs on demonstration plots. We report here on experience in a major scaling up of this in Ethiopia as reported by Howard et al 1999.

9.3.1.6 Millennium villages

The Millennium Villages Project has established integrated projects in selected villages to demonstrate the substantial changes that are possible with significant investments in health, agriculture and community development. A major part of this is the provision of subsidised agricultural inputs (seed and fertiliser). Although the projects have only been established relatively recently, monitoring and evaluation systems are in place and we draw on reports from Kenya and Malawi (Buse et al, 2008; Denning et al, 2009). This approach has similarities with the Sasakawa Global 2000 approach in that it has invested in relatively small scale, localised input subsidy programmes with much wider objectives of national scaling up.

9.3.1.7 Malawi sustaining productive livelihoods through inputs for assets (SPLIFA)

For two years when the Targeted Input Progamme was being implemented in Malawi, IFDC and partners also implemented an innovative project (Sustaining Productive Livelihoods through Inputs for Assets or SPLIFA) under which food insecure households in particular communities were provided with input vouchers as payment for public works. These vouchers could be redeemed at local agro-

dealers, who were also supported with technical training, delivery of inputs, and a commission for voucher redemption (Gregory, 2006). This project is of interest as an early use of vouchers with specific objectives to simultaneously support both agrodealer (input supply) development and food security among poor subsistence producers.

9.3.1.8 Nigeria developing agricultural inputs markets in Nigeria (DAIMINA)

The Developing Agricultural Inputs Markets in Nigeria (DAIMINA) project, also implemented by IFDC, also used vouchers to pursue twin objectives of agrodealer development and increased producer access to and use of inputs (Gregory, 2006). Like the Malawi SPLIFA project, this was relatively small scale, but instead of providing free inputs to poor food insecure households it tested the use of vouchers within a much larger national fertiliser subsidy programme. The standard national programme purchased fertiliser from importers and then distributed to state level blenders and agricultural development programmes. This national progamme, however, undermined the development of private sector, commercial sales, and suffered from substantial leakages and non-payments from states to the federal government. DAIMINA trialled the use of vouchers to allow small agrodealers to deliver subsidised fertiliser to farmers.

9.3.2 Lessons from reviewed programmes

Table 9.6 summarised information available for each of the 10 reviewed programmes against the major issues identified as important for subsidy programme evaluation. We consider these under the main headings of programme objectives, programme design and implementation, and programme outcomes.

9.3.2.1 Programme objectives

The first part of table 9.6 shows for each of the 10 reviewed programmes the stated objectives of the programme[27]. Here we consider how far the different possible programme objectives are found in the different programmes and types of programme:

- food security (household or national), input adoption, and producer welfare are found as objectives of all or almost all programmes (with variation as regards particular emphasis on poorer or food insecure producers);
- not one of the programmes explicitly recognises the potential for producer subsidies to benefit poor consumers[28], except subsistence producers, and

[27] Political objectives were not stated but are inferred from context, design and implementation.

[28] It may be that inclusion of recent programmes in Mali or Senegal (if information were available) would have provided examples of programmes with an explicit objective to reduce consumer prices.

related to this there is no recognition of the potential role of subsidies in addressing the price-productivity tight rope and only in the Sasakawa 2000 and MVP is there a wider recognition of the potential role of subsidies in driving forward pro-poor growth: even here there is no explicit consideration of the mechanisms by which this may be achieved[29];
- input use efficiency, input supply system development and soil fertility replenishment are only explicitly considered as programme objectives for particular programmes or types of programme;
- political considerations are important for all of the large scale programmes (Ghana, Zambia, Kenya and Malawi).

9.3.2.2 Design and implementation

Design and implementation features of the different programmes are shown in the second part of table 9.6..

There is broad commonality across the different programmes as regards:

- the basic focus of subsidy systems on producers as major (and generally sole) direct subsidy recipients;
- a primary focus on subsidising inputs for staple food production (for subsistence production or for sale into domestic markets) ;
- very substantial subsidised input price reductions (of 50% or more for all programmes except DAIMINA), consistent with measures to address both affordability and profitability constraints to input use;
- all programmes rationing (or attempting to ration) the quantity of subsidised inputs to be received per household, with vouchers being a common (but not universal) means of achieving this; and
- use of private sector importers to provide basic fertiliser supplies.

There are differences across the programmes as regards:

- scale, with some national programmes and others piloting potential national programmes;
- targeting, with some programmes focussing on food insecure/ vulnerable households and others seeking to maximise production by focussing on less poor households (although this may be misguided if (a) smaller, poorer farms are more efficient (Hazell et al, 2007) or (b) displacement is higher with less poor households);

[29]Other programmes may also implicitly consider that increased productivity and producer welfare may drive forward growth, but consideration of the food price, non-staple and non-farm production and demand mechanisms is absent.

- use of vouchers for targeting, rationing, and/or supply system development;
- private sector involvement (and nature of involvement) in distribution;
- complementary policies, and their links to programme objectives.

9.3.2.3 Programme outcomes

Different programme outcomes – or information gaps about particular outcomes – are closely related to programme objectives. Thus limited examples of subsidies leading to output (food staple) price changes and the lack of information on labour demands and markets and longer term and wider welfare and growth impacts are not surprising. Similarly the lack of information on soil fertility replenishment is consistent with the lack of emphasis on this in programme objectives. There are, however, other similarities in outcomes that cut across differences in programme objectives, notably common (but not universal) problems with late input delivery in subsidy programmes (problems which are not confined to larger scale programmes) and common (and again not universal) lack of information on leakages (although such information is very difficult to collect and verify). Both of these are important for programme impacts, irrespective of programme objectives. Overall there appear to be large potential benefits from effective and efficient input subsidy implementation – but also the potential for large economic losses. However it is very difficult to estimate indirect benefits from lower food prices, but there Is little information on output price impacts for most programmes, and lower prices have ambiguous effects: lower food prices lower returns as estimated from conventional cost:benefit analysis but should increase the wider economic benefits from the programme if these lead to indirect benefits from growth linkages or multipliers; in Ethiopia lower output prices as a result of increased production led to farmer losses and the collapse of the programme.

There are also, of course, substantial differences across programmes, some of these related to differences in programme objectives, as noted above. Thus different welfare and growth impacts are related to differences in interest in these impacts, as are some differences in input supply system impacts. However programmes with the intention of developing supply systems may actually undermine them, if poorly designed and implemented: it appears that larger scales programme have tended to damage the commercial interests of local fertiliser distributors while offering benefits to fertiliser importers. Similarly differences in incremental input use, production, and productivity (fairly universal objectives) are determined more by differences in design and implementation effectiveness and efficiency.

While all the programmes have some have external reporting (otherwise they could not be included in this review), there are marked differences in reported performance monitoring and audit systems. There are also very few programmes for which information on economic or fiscal returns are estimated (and where these are available they were provided by external reviews). This may be linked to the

emphasis on production in programme objectives – though again information on production does not seem to be universally important.

9.3.3 Conclusions from recent experience

A number of observations from the limited programmes reviewed here warrant particular emphasis:

First, it is notable how difficult it is to find comprehensive reviews of subsidy programmes, despite the substantial number of programmes that have been or are being implemented across Africa and the very substantial investments of public funds in these programmes. There is an important need for country studies to document country experiences, using the conceptual framework developed in this paper.

Second, there is a strong tendency for programmes to focus on production objectives and producer welfare, and to ignore the interests of consumers and the processes (and necessary conditions) for subsidy programmes to contribute to wider pro-poor economic growth. This is a critical omission, and is linked to the limited extent that the design and implementation of many programmes are integrated with complementary investments. Such integration is needed first for subsidy programmes to effectively deliver their stated objectives of incremental production, and then for them to contribute to wider processes of pro-poor growth. Recognition of the importance of consumer price benefits and of the price productivity tightrope is particularly important here.

Third, and related to the previous two points, there appears in some programmes to be an unfortunate lack of interest in improving effectiveness and efficiency. This is evident from the limited monitoring, evaluation and audit systems in some programmes, limited cost benefit and fiscal efficiency analysis, and limited attention to possible problems of displacement and leakage. This may be related to political economy issues (as discussed earlier in section 9.2.3.12). As will be discussed below (in section 9.4), growing challenges in a changing world will make it even more important that governments improve the efficiency and effectiveness of input subsidy programmes in both raising productivity and promoting wider pro-poor growth within and beyond agriculture.

Two notable commonalities observed across programmes are (a) the lack or limited focus on replenishing soil fertility and (b) a strong (almost universal) prevalence of heavy subsidies (50% to 100% subsidy rates) on rationed inputs. This commonality occurs despite differences between programmes as regards first relative emphasis on improving national food security (and total input use and production) as against improving household food security (and helping food insecure households) and second relative emphasis on supply system development.

9.4 Subsidy programmes in a changing world

At the time when this review was conceived, global food and fertiliser prices were at almost unprecedented high levels, and a significant focus of the review was to be on the way that high food and fertiliser prices affected the benefits and costs of input subsidy programmes. Global food and fertiliser prices have, however, fallen right back since then, as shown in figure 9.11, though domestic food and fertiliser prices remain high in many countries and international phosphate fertiliser prices have not fallen back as far as food and nitrogen fertiliser prices. The international credit crunch has also led to a global economic slow down. Looking back, the high food prices in mid 2008 are seen to result from the coincidence of a number of different processes and events: a steady decline in global agricultural investment, in production growth and in food stocks; weather events in some grain producing areas; changing agricultural and environmental policies in many developed economies (including subsidies for biofuels); high oil prices; and complex international commodity market behavior, including financial speculation, physical hoarding, and national protectionism. Similar processes affected fertiliser prices. Paradoxically, interactions of these same processes together with the financial collapse then caused prices to fall again. The principal lesson that needs to be drawn from this is that we appear to live in a world with increasingly volatile and unpredictable markets and, with climate change, changing and more unpredictable weather. What are the implications of this for large scale input subsidy programmes?

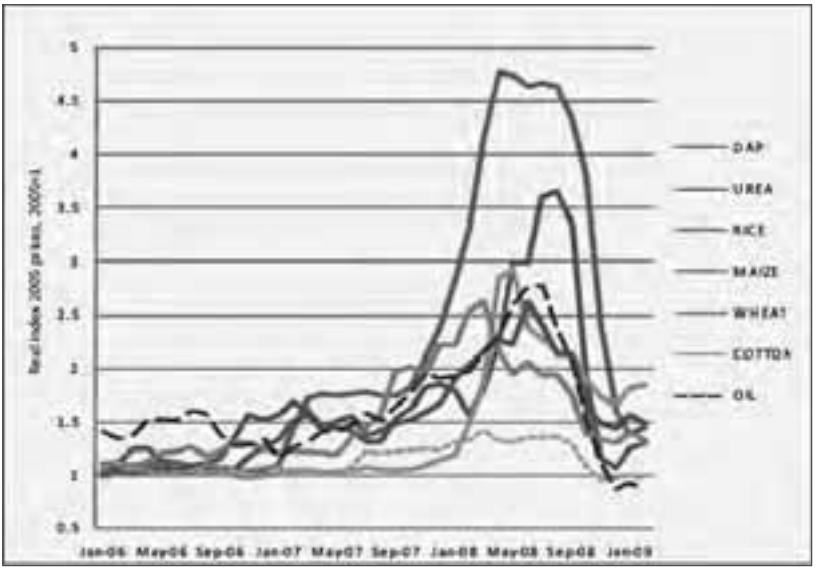
We address this question by first considering separately the effects of high food prices and of high fertiliser prices. We then examine the effects of interactions of price volatility between food and fertiliser prices, and conclude our discussion with consideration of the impacts of climate change.

9.4.1 Impacts of high food prices

Before we examine the impacts of high food prices for agricultural input subsidies, we must first briefly consider the effects of high food prices on poor rural economies and the people within them. Impacts will vary for different people, and most obvious negative impacts will be on poor consumers who are connected to global markets – for example poor consumers whose staple food is imported grain of some sort. For consumers a rise in staple food prices leads to a fall in real income – the extent of the fall increasing with the importance of staple food expenditures in total expenditures, as illustrated in table 9.7.

Loss of real income has immediate effects on expenditures and consumption, welfare, and liquidity, and long term effects as a result of reduced expenditure on education, nutrition and health. In addition the reduced real incomes and expenditures of large numbers of poor people will reduce aggregate demand and economic growth.

FIGURE 9.11
Commodity price indices 2006 to February 2009 (2005 prices, 2005=1)



Source: World Bank data

TABLE 9.7
Effects of 100% increase in staple food prices on total expenditures for high and low income households (illustrative figures)

	Income	Initial expenditures			Expenditures after price rise			
		food expenditure		balance non-food	food expenditure		balance non-food	
		% initial hh expenditure	$		$	% initial hh expenditure	$	change
High	7500	10	750	6750	1500	20%	6000	-11%
Low	2500	30	750	1750	1500	60%	1000	-43%
Very low	1500	50	750	750	1500	100%	0	-100%
Extremely low	1000	70	700	300	1400	140%	-400	-233%

It is often argued that opposite effects will be experience by food producers, but this is not the case as most poor producers, and indeed around 50% of all producers in much of Africa, are net buyers of food (in that they do not produce enough food for their annual requirements, and hence rely on the market to purchase food, see for example Barrett 2008). Such people are affected in a similar way as the

consumers described above with the added problem that the consequent liquidity problems affect their seasonal investments in agriculture, in food production – poor households often have a backward sloping supply curve (see for example Dorward, 2006). Less poor farmers may also suffer (or at least not benefit) from higher food prices as much of their income may come from cash crops and non-staple animal and crop products (rather than staple food crops) and demand and prices for these may be depressed.

These considerations suggest that the poverty impacts of the 2008 food price hike may be considerably greater than the 100 million (around 10%) estimated increase reported by Ivanic and Martin (2008) as their estimate was based on 2007 price increases and also ignored the liquidity effects discussed above, and balance of payment, inflation and other macro-economic effects. It also assumed that higher food prices lead to rural wage increases (whereas in the poorest economies with large numbers of food deficit producers high food prices can reduce rural wages – again see for example Dorward, 2006).

This analysis, together with the analysis of potential subsidy impacts in earlier parts of this paper, suggests that high food prices substantially increase the potential benefits of well designed and implemented agricultural input subsidy programmes. Such programmes should address the affordability problems of input use which (for poorer, food insecure producers) are exacerbated by high food prices (although profitability problems in input are of course diminished by high food prices), and increase the importance of input subsidies' potential contributions to addressing the food price – productivity tightrope and to stimulating dynamic pro-poor growth and structural change. Such situations may also improve the alignment between political economy and economic growth objectives of input subsidy programmes.

9.4.2 Impacts of high fertiliser prices

The impacts of high fertiliser prices on poor rural economies have been discussed by Dorward and Poulton (2008) and are summarised here. Again we need to consider different impacts on different types of people within poor rural economies.

Farmers are likely to be very exposed to high international fertiliser prices as most poor rural economies import fertilisers from the world market: they are then hurt by high fertiliser prices in terms both of the profitability of fertiliser use and the affordability of fertiliser purchases – the latter issue, as argued earlier in section 9.2.3.2, very important and easily overlooked. . Profitability problems may be offset by product price increases – but, for example, although food prices rose markedly in 2008 (though not as much as fertiliser prices), prices for cash crops (on which much fertiliser is used in Africa) were largely static - and average returns of fertiliser use on such crops were already not very high (Meertens, 2005). This may lead to political pressures for fertiliser subsidies for cash crops (from influential constituents)

although the analysis earlier in this paper (in sections 9.1 and 9.2) suggested that input subsidies should yield higher returns when applied to staple crops as compared with cash crops. Here input subsidies may have a critical role to play as without them input use on food production may fall, increasing domestic prices, with all the attendant problems described above in section 9.4.1 – including further exacerbation of the affordability constraints to input use.

However, while high input prices may increase the need for input subsidies, they also undermine their short term returns (as measured by cost benefit analysis) and undermine a nation's ability to afford them. The former issue arises because high input prices reduce the profitability of input use, the latter issue arises because national economies may be undermined by reductions in growth as a result of reduced agricultural production while the foreign exchange balance may suffer from both more expensive inputs and reduced export volumes – these macro-economic problems will of course depend upon the importance in the economy of different forms of agriculture and of agriculture as a whole, and on the importance, performance and terms of trade of other sectors. However Ethiopia provides an example of a country where high fertiliser prices exacerbated foreign exchange difficulties which were then addressed by an IDA grant and credit totalling US$ 250 million to provide foreign exchange (but not domestic currency) for importation of fertilisers (World Bank 2008). There are, therefore, close parallels between the threats and paradoxes posed to individual farmers by high fertiliser prices and those posed to national economies.

Fertiliser suppliers may also be adversely affected by high fertiliser prices. While producers may enjoy large increases in profits if prices rise more than costs, the impacts on fertiliser traders and importers are more ambiguous and often negative. Traders with large stocks will gain if increasing fertiliser prices allow them to increase sales prices of existing stocks. However they may suffer from reduced sales volumes if higher prices lead to reduced demand by farmers (as discussed above) and they may also find it difficult to raise the working capital to buy more expensive fertiliser stocks. Traders may also suffer from falls in fertiliser prices if they have bought when prices are high and hold high price stocks while competitors can bring in lower price stocks.

Fertiliser prices have subsequently fallen back from the peak prices of mid 2008, but prospects for future prices are uncertain. Some observers predict increasing concentration among suppliers (Roy, 2009) and there are fears that carbon taxes and/or increasing oil prices may again push fertiliser prices up in the future.

9.4.3 Interactions of price volatility between food and fertiliser prices

What are the implications for input subsidy programmes of interactions of price volatility between food and fertiliser prices?

Food and fertiliser prices may interact in a number of ways over different time periods. First, changes in the global economy and in global markets may impact them both in similar ways – for example high oil prices may simultaneously push up fertiliser prices (as energy costs are a major component of nitrogen fertiliser production costs) and, through increased biofuel demand, also push up grain (particularly maize or corn) prices. Commodity speculation may also push up food and fertiliser prices together. Similarly, but over a different time span, credit difficulties may reduce both investment in fertiliser production plants and investment in fertiliser use for food production. High fertiliser prices may also lead to reduced food production in the subsequent season – and high food prices should push up fertiliser demand (if commercial farmers are not credit constrained) and hence fertiliser prices.

These positive interactions between fertiliser and food prices may, however, also be offset by normal supply and demand responses to high prices. These are also, on the other hand, affected by seasonal time lags, which complicate the planning and management of input subsidy programmes. This may be illustrated by Malawi's experience with input subsidies in 2007/8 and 2008/9. Rapid food and fertiliser price rises in international markets in late 2007 and early 2008 meant that relatively low priced fertiliser (bought in the middle of 2007) was used to produce maize harvested in mid 2008 when international prices were very high – yielding a very high estimate of economic returns from the input subsidy programme. For the 2008/9 programme, however, fertilisers were bought when prices were very high, but the maize produced by those fertilisers will be harvested in March to May 2009, when, based on current prices, international maize prices are expected to be very low – and as a result the 2008/9 programme may yield a very low estimated economic return (Dorward and Chirwa, 2009). Such temporal difficulties, together with the wider economic and balance of payments effects of fluctuating input and food prices, are likely to make management and control of input subsidy programme expenditures very difficult, and similar difficulties will be faced in attempts to stabilize food prices – while in section 9.2.3.6 it was argued that the complementary management of input programs and staple food price stabilization policies is critical for achievement of longer term economic growth benefits from input subsidy programmes.

As another complication, general uncertainty in fertiliser and other commodity markets, and the potential for this to increase the likelihood of political interventions, also increases fertiliser traders' and importers' risks Dorward and Poulton (2008).

9.4.4 Impacts of climate change

Climate change will have varied and difficult to predict impacts on agriculture in Africa. Average annual rainfall may increase or decrease in different areas, but in almost all areas will become more variable, with increased incidence of both

droughts and floods. This will increase market instability and both production and price risks in input use. At the same time there will be global mitigation policies that may discourage and/or raise the price of inorganic fertiliser use (as a result of high fossil fuel energy intensity and hence high carbon foot print of the manufacture of nitrogen fertilisers, and possible CO_2 taxes or costs in reducing CO_2 emissions). Increased resilience and reduced vulnerability in the face of the indirect and direct threats of climate change can be achieved by greater natural, social, physical, human and financial capital and greater diversification of cops within farms and of farm and non-farm activities within local and national economies. Increased capital and diversification are intrinsic components of economic growth and development. The major implication of climate change for input subsidy programmes is therefore to increase the urgency and importance of such programmes' contributions to rapid broad based pro-poor growth through more effective design and implementation and through more effective integration with complementary policies and programmes in food markets and prices, in natural resource conservation soil fertility, and in wider non-farm diversification and development.

9.5 Conclusions

Countries considering the introduction of agricultural input subsidies can learn a number of points from the theory and experience summarized in this paper, recognising the different major benefits they can potentially yield, the conditions required for those benefits to be realized, and the possible very significant pitfalls from ineffective or inappropriate implementation. Key conclusions from theoretical and historical analysis are that:

- input subsidies have played an important role in successful agricultural development in the past, offering major potential gain when effectively applied to overcome market failures constraining growth in poor rural areas, but also carrying substantial risks of costly, ineffective and inappropriate design and implementation using large amounts of scarce government and national resources for little gain;
- they have greatest (but not exclusive) potential in contributing to wider growth when applied to the production of staple grains rather than to cash crops (as a result of both the greater contribution to overcoming producer constraints on input use in staple food production and the greater benefits to consumers from their stimulus to increased production of staples);
- a key contribution of input subsidies will commonly be their contribution to consumers' welfare and real incomes through lowering food prices, while also benefitting producers, but this requires very large scale implementation to bring prices down (perhaps below import parity) with substantial costs and risks and a strong emphasis on wider pro-poor dynamic growth objectives and complementary investment and output market development policies;

- the dynamic policy objectives of input subsidies are, like policy objectives in wider agricultural development, paradoxical – with investments in staple crop production and agriculture in order to stimulate diversification out of staple food and agricultural production;
- rationing and targeting are important features of effective subsidies – to limit costs and ensure that subsidies are largely delivered to producers whose effective input use is constrained by market failures – and smart subsidies use for rationing and targeting can substantially address conventional criticisms of subsidies;
- smart subsidies are nevertheless still subject to major political economy and implementation challenges and need further new thinking and theory, with ongoing action research seeking to constantly improve effectiveness and efficiency and to keep ahead of fraud and rent seeking.
- agricultural input subsidies are not a short term 'quick fix' –medium to long term investments in input subsidies are needed if they are to build up farmer knowledge and capital, supply systems and wider economic growth. However the risks of their diversion, capture and inefficiency also grow over time, and this poses major political and technical challenges.

A review of a limited number of current and recent input subsidy programmes in Africa shows that there is limited implementation of important aspects of smart subsidies, and weaknesses in design and implementation. There is also a lack of emphasis on improving programme effectiveness and efficiency and inadequate attention is paid to integration with complementary policies and programmes for improving achievement of both direct and indirect benefits of input subsidy programmes. There is also a mixed record as regards use of input subsidies to develop input supply systems. Some of these aspects of input subsidy programmes are associated with divergence between political economy and more technocratic interests. Nevertheless these programmes have the potential to yield very substantial short term economic and longer term growth returns.

Lack of information on subsidy programmes in Africa highlights a major need for country studies that report different countries' recent experience with input subsidies, using the conceptual framework presented in this paper to allow a more comprehensive review and lesson learning than is currently possible.

Consideration of the considerable challenges and threats posed by global market and climate change and volatility emphasises the importance and urgency of (a) improving the efficiency and effectiveness of input subsidy programmes in contributing to increased agricultural productivity, food security, and wider non agricultural development and structural change, and (b) of looking for ways to reduce fertiliser use (through greater field efficiency in their application and through use of complementary soil fertility management practices) and to reduce supply costs.

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