This paper was first presented to the Working Party on Agricultural Policy and Markets, 15-17 November 2010. Reference: TAD/CA/APM/WP(2010)45.

Global Forum on Agriculture

29-30 November 2010

Policies for Agricultural Development, Poverty Reduction and Food Security

OECD Headquarters, Paris

The Use of Input Subsidies in Developing Countries

Steve Wiggins, ODI,
steve-wiggins@ntlworld.com;
Jonathan Brooks, OECD Secretariat,
jonathan.brooks@oecd.org

TABLE OF CONTENTS

Tables

Figures

Boxes

THE USE OF INPUT SUBSIDIES IN DEVELOPING COUNTRIES

1. Introduction

1. Interest in input subsidies, particularly those on fertiliser, has revived, notably in Africa. This may surprise, since it runs counter to orthodox economic advice that subsidies on private goods should be avoided, since they distort resource allocation, are often costly and difficult to sustain without cutting spending on valuable public goods, while as a way of transferring resources they are inefficient and often inequitable. In the case of high income countries, OECD analysis suggests that less than half the value of an input subsidy translates into higher net incomes for farm households, with the majority of the transfer leaking to input suppliers or incurred as efficiency losses (OECD, 2001).

2. Why, then, the resurgent interest? The principle reason is concern in developing countries, in Africa in particular, that increased agricultural production to reduce poverty and improve food security has been stymied by the inability of many farmers to use the inputs and technology that are known to be effective. In more detail, the argument runs as follows:

- Food production per capita in Africa has grown too slowly, well behind rates seen in Asia and Latin America (Figure 1);
- This has resulted in rising imports of cereals and other staples, and more people who are hungry and undernourished (Figures 2 and 3);
- Yields of staples per hectare have barely risen at all in the region (Figure 4), largely since farmers have not applied manufactured fertiliser in sufficient amounts (Figure 5) to take advantage of improved varieties;
- Farmers have not done so because inputs have been too costly and they have been too poor, with little or no access to credit;
- Hence in order to resolve the impasse it is necessary to subsidise the costs of inputs — thereby creating a virtuous circle of higher yields, higher incomes, more food, less hunger and poverty.

3. The argument for subsidies is attractive on several grounds.

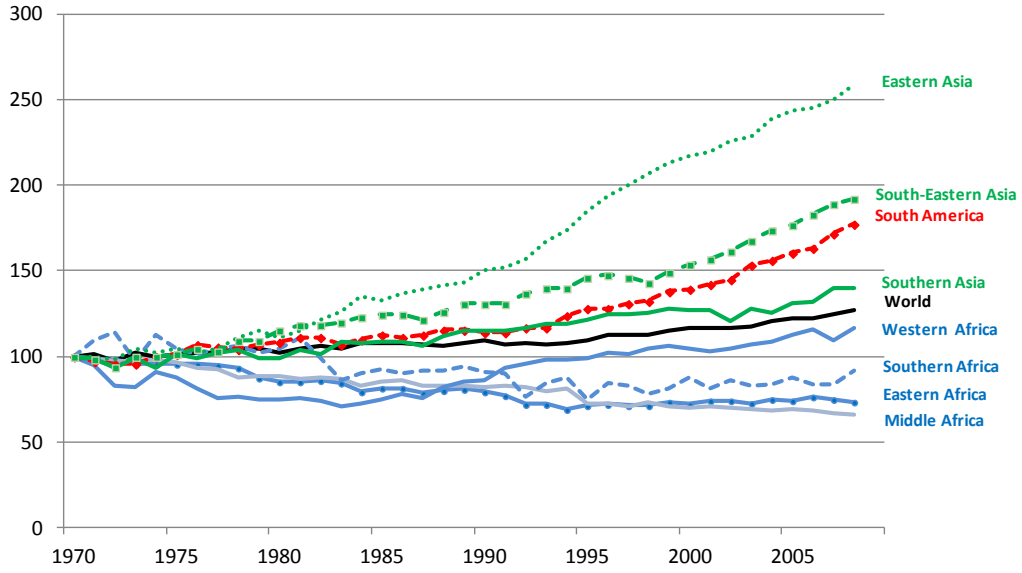
> ‘ … the siren call of subsidies continues to be hard to resist; they are politically attractive, seem easy to implement, and the problems they are intended to address remain compelling at both the national and international levels.’ (Crawford, Jayne & Kelly, 2008)
>
> Subsidies look as though they provide a ready solution to otherwise difficult problems of developing input markets and associated financial services to small farmers. While other ways of overcoming such problems are complicated, with success uncertain, a subsidy is a relatively straightforward measure to implement.

4. Politically, subsidies are a highly visible gesture to rural voters, as well as potentially also being an instrument of patronage. To some, moreover, the sight of the state taking direct action to overcome the failings of markets, often regarded with suspicion in the first place, is welcome. Moreover, in parts of the

developing world orthodox advice to avoid subsidies is treated with suspicion, since it usually comes from people in countries where farmers are subsidised. The advice is seen as hypocritical.

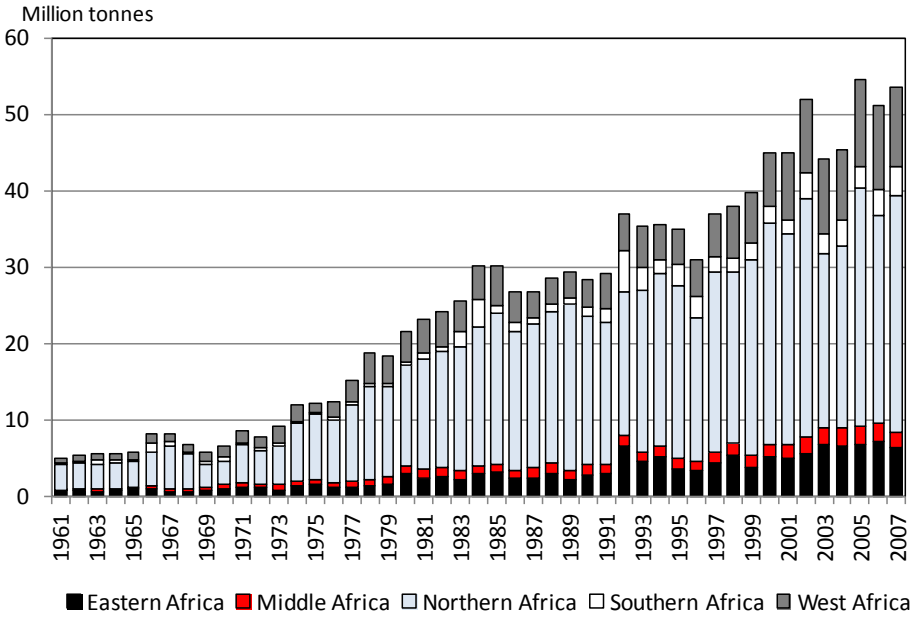
5. Yet perhaps the greatest attraction lies in the apparent simplicity of a single measure, a subsidy, to meet a wide range of objectives: economic, social and political. It is thus necessary to unpick the different justifications that can be offered for subsidies.

Figure 1. Food production per capita since 1970



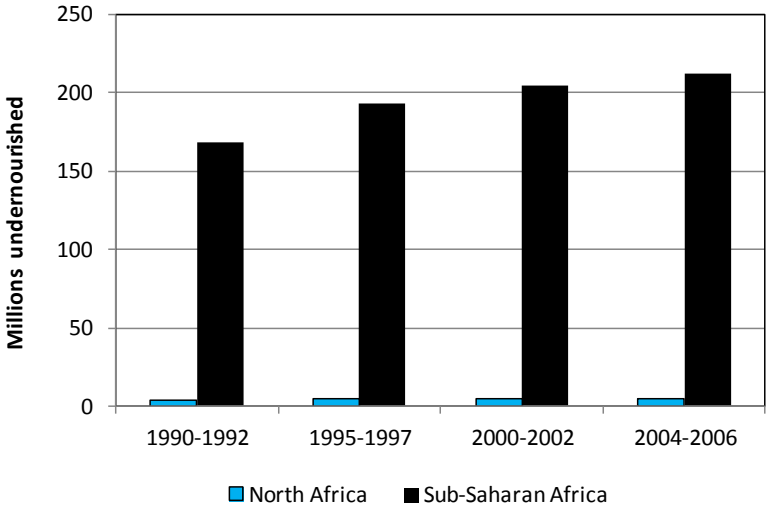
Source: FAOSTAT.

Figure 2. Cereal imports to Africa



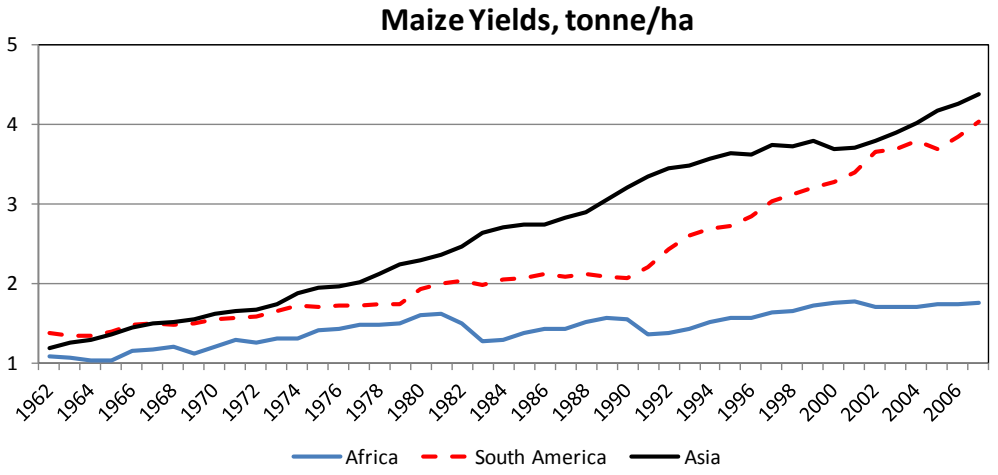
Source: FAOSTAT data.

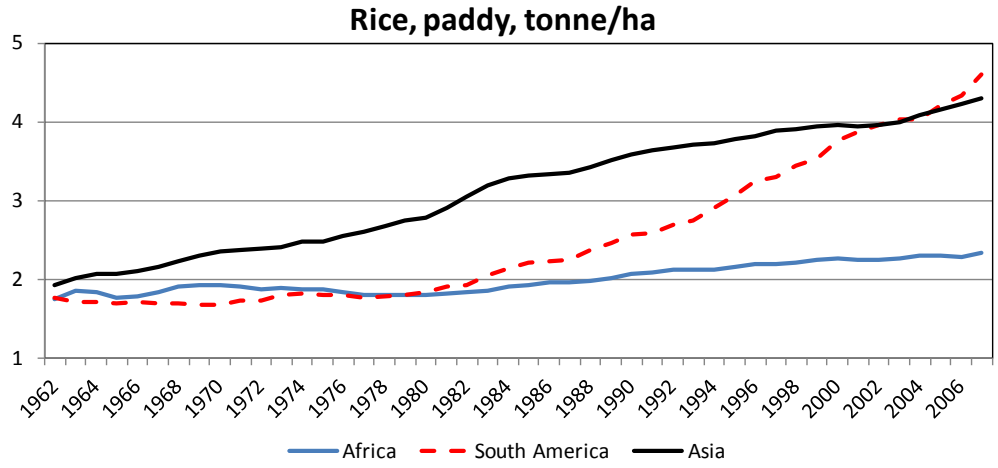
Figure 3. Numbers undernourished in Africa



Source: FAO data on estimated numbers undernourished.

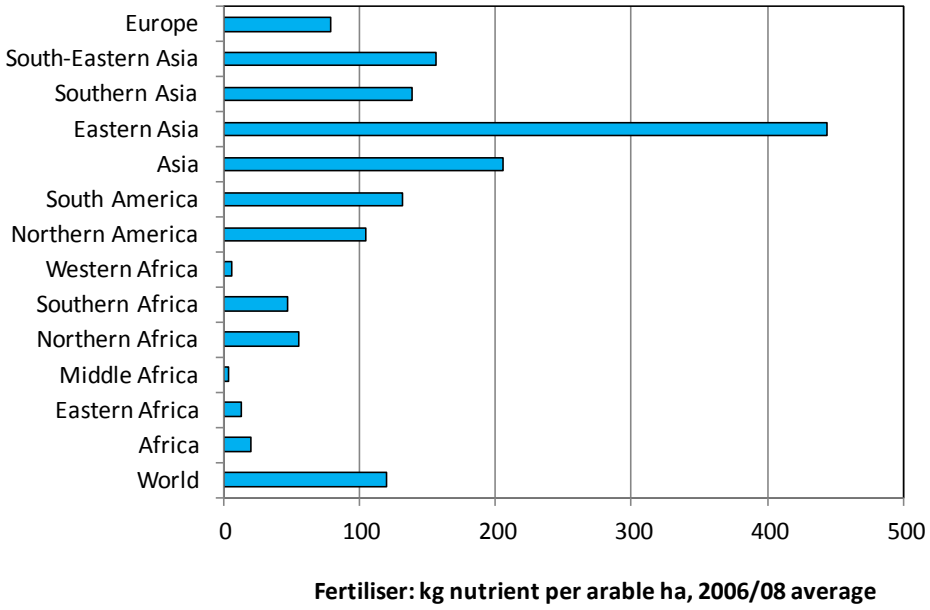
Figure 4. Staple food yields in Africa since early 1960s, 3-year moving averages





Source: FAOSTAT.

Figure 5. Fertiliser application rates, kg nutrients/ha arable land



Source: FAOSTAT.

2. Unpicking the arguments: objectives of input subsidy programmes

6. The broad argument that input subsidies can lead to higher incomes, reduced poverty and improved food security is based on specific claims with respect to a range of underlying objectives. Most of these underlying objectives have either an economic efficiency rationale (*i.e.* reflect a market failure of some kind), or are concerned with reallocating income to a particular constituency (for reasons of social equity or political patronage). The main economic objectives are:

1) Stimulate agricultural production.
2) Compensate for high costs of transport from port or factory to farms that raise costs of inputs**.**
3) Improve soil quality and combat soil degradation (in the case of fertiliser).
4) Offset high costs of supplying inputs when markets have low volumes and economies of scale in logistics cannot be achieved.
5) Make inputs affordable to farmers who cannot buy them, owing to poverty, lack of access to credit, and inability to insure against crop losses.
6) Learning — to allow farmers to try novel inputs and become familiar with their advantages.

Further objectives are:

7) Social equity – to transfer income to farmers who are poor, live in remote disadvantaged areas, or both.
8) This may sometimes be difficult to disentangle from the motive of political patronage – to win favour with voters and reward supporters.

7. Raising the level of output (objective 1) is not in itself an efficiency issue. However, this objective reflects the notion that output may be less than optimal because of underlying market failures, for

example the sub-optimal use of inputs, and the possibility that higher output could lead to external economies of scale (a "thickening of markets"). The benefits of using input subsidies need to be compared with the costs of tackling those market failures directly.

8. The same goes for objectives 2 and 3. The optimal way of offsetting high transport costs is to invest in infrastructure. Similarly, while applying more fertiliser can raise soil fertility and prevent soil degradation, there are other ways of doing this that may be more effective and economical, such as terracing to prevent soil erosion.

9. Arguments four and five are central to current debates: these aims are about correcting market failures affecting input supply, finance and insurance. One set of failures (objective 4) arises in the supply chain. When potential input dealers know too little about the demand for inputs, and suspect that demand may be low, they will not stock them. What little stock they may carry then has a high mark-up to cover both the risk of not being sold as well as high unit costs for transport and storage of small lots, since scale economies are not achieved. Another set of failures (objective 5) affects farmers. They lack the cash to buy inputs early in the crop season and cannot obtain credit. Banks or input dealers will not offer credit if they do not know enough about the competence and character of farmers seeking loans, or will only do so if they can get collateral and character references — requirements that many small farmers cannot meet. Farmers, moreover, may be reluctant to accept the risk of credit in any case, since they would be unable to repay the loan if the harvest fails. Formal insurance policies are usually absent in rural Africa, since would-be insurers face similar problems to the bankers: the underlying risks are difficult to calculate, the character of farmers is unknown. Offering them insurance would be foolhardy without this information.

10. If market failures are severe, farmers could become locked into low levels of productivity, even when the technology and economic opportunity exist, since they cannot access and afford the seeds and inputs to take advantage; and thus they remain trapped in poverty, too poor to work themselves out of this condition (Dorward *et al.*, 2004; Duclos & O'Connell, 2008). If this applies to many farmers, as it may in some countries where the majority of rural households are poor, then a household poverty trap becomes a major drag on national economic growth as well. It is not then surprising that there have been calls for governments to intervene to correct the failures, if necessary by subsidising costs — and if necessary by providing inputs directly to farmers. A lively current debate in Africa turns on how widespread and severe are these rural market failures; and whether there are other ways of remedying them than input subsidies.

11. Reason number six, on learning, is another form of market failure. Farmer demand for improved inputs may be low simply because they have too little experience of their advantages. There is a strong case for a subsidy in such cases, but since farmers can try out inputs and assess their advantages within a couple of seasons, a subsidy on these grounds would be short-lived. Moreover, since farmers tend to try out new ideas on limited areas, the subsidy need only cover a small amount of seed, fertiliser, chemical, etc. per farmer: there is no need to a blanket subsidy in such cases. It is thus not surprising that a common alternative to a subsidy for learning is to distribute, free, starter packs with improved seed and fertiliser sufficient to plant an acre or less.

12. Finally, argument seven, the use of input subsidies to transfer income to poor farmers or those disadvantaged by location needs to be set against the effectiveness and economy of doing the same by direct payments,[1] food aid distribution, or employment programmes paid in cash or kind.

13. For all of the market failure (efficiency) reasons commonly cited for subsidising inputs, there are theoretically superior ways of achieving the same objective. Similarly, input subsidies are not the optimal

1. Cash transfers may be conditional on the clients sending children to school, or on mothers attending primary health care clinics with infants.

way of transferring incomes to a target constituency. The arguments therefore come down to the relative cost-effectiveness of different instruments and practicalities of implementation. In this respect, it is important to consider the disadvantages and drawbacks associated with input subsidies.

3. Disadvantages and dangers of input subsidies

14. Arguments against subsidies include the following:

1) Subsidies may be ineffective in raising use of inputs and increasing yields. It is not always the case that the volume of inputs applied is sensitive to price. Studies in Sri Lanka (see below), for example, report low elasticities of fertiliser application with respect to its own price: instead the volume of fertiliser applied corresponds more closely to the area under irrigated rice and to the price of rice. The corollary in these cases is that much of the subsidised fertiliser merely displaces fertiliser that would have been bought without the subsidy.

2) Heavy subsidies on inputs potentially distort the relative costs of factors, leading to inefficient allocation of inputs, with the subsidised inputs substituted for other factors. This applies particularly where inputs are substitutes, rather than cases where they are complementary. The most often cited case for agriculture is that of farm machinery, where capital grants and tax exemptions for tractors and harvesters lead to farmers using machinery to displace day labourers — in places where there are many landless looking for work. Fertiliser is typically thought of as a complementary input, but there may be cases in which it is a substitute.[2]

3) Subsidies intended to benefit specified groups of farmers, or to stimulate particular crops, may be less effective than intended as leakages occur. For example:

   – When farm profits rise, landlords may be able to raise land rents and thus effectively appropriate the value of the subsidy. The degree of this leakage depends on the extent to which farmers rent rather than own land (or have otherwise secured land rights), and the extent to which the price of land is bid up. The nature of these leakages is assessed using the DEVPEM model [see TAD/CA/APM/WP(2010)43].

   – When subsidy programmes allow discretion to local officials and field workers in allocating subsidies inputs, there is the danger that they will use their power to extract bribes.

   – The same local discretion may be used to divert subsidised inputs from intended beneficiaries to others, such as local elites and political supporters. In some cases this arises since field workers have different priorities to policy-makers. For example, in Malawi some field staff reportedly prefer to allocate subsidy vouchers to farmers they consider most likely to make good use of the input, rather than those who cannot afford fertiliser at commercial prices (Dorward and Chirwa, 2011).

   – When subsidised inputs are intended for use on a particular crop — often food, they may be switched to higher value cash crops. For example, some of the subsidised fertiliser in Sri Lanka intended for rice is reportedly diverted to vegetable production. This may not be a problem in economic terms, but it subverts the intended objective, which in the case of Sri Lanka is greater self-sufficiency in rice.

2. For example, women farmers in Swaziland have been seen to substitute fertiliser for weeding: they are chronically short of labour, but have remittances from their miner husbands in South Africa, and hence it makes sense to push up yields with fertiliser even as yields are depressed by weeds.

4) Subsidy programmes may be implemented in ways that repress the development of private supply of inputs, by delivering inputs through state agencies and bypassing nascent local input dealers.

5) When subsidised inputs dominate the supply of a particular input, then subsidies may become closely linked to government budget cycles, or to electoral cycles with pronounced swings in availability; so that supplies whether or not they are subsidised, may not be regular, reliable and timely.

6) All this said, often the main objection to subsidies is their high cost. In the three cases outlined below of India, Malawi and Sri Lanka, input subsidies have taken up 10%, 15% or more of the total government budget — sometimes more than what the government spends on education. When state agencies are used to distribute subsidised inputs, there may little incentive for them to economise on logistics.

What is more, the cost of subsidies can rise if:

- the subsidy is effective in encouraging greater use of inputs;
- policy makers are tempted use the subsidy as a way to stabilise input prices, so that when the cost of inputs rises, the subsidy is used to maintain the same nominal cost to producers;
- subsidised inputs are smuggled across borders to neighbouring countries where inputs are more expensive (a problem if the subsidy is not rationed or otherwise limited); and, if
- political competition for rural votes leads parties to make election pledges to increase subsidies.

7) Once in place, subsidies can be difficult to remove. They can be seen as a political signal of support to farmers, around which farmers sometimes form electorally powerful lobbies for their continuation.

15. The often high costs of subsidy programmes need to be set against the benefits they create and counted in terms of the missed opportunities to use public funds for other purposes. There cannot be a general judgment on the balance between potential benefits and disadvantages of subsidies: so much depends on particular circumstances and the design of the programme. The next section reviews some experiences of input subsidies.

4. Experiences of input subsidies

4.1. Malawi's fertiliser subsidies[3]

16. Fertiliser subsidies in Malawi date back to the mid-1970s, but were suspended in the early 1990s under liberalisation. Targeted starter packs of seed and fertiliser sufficient to plant one tenth of a hectare were introduced in 1998/99, intended to allow small farmers to learn of the benefits of the package, to increase food production, and improve their incomes. These were effective in raising output of the main staple, maize, but not sufficient as the country experienced poor harvests in 2001, 2002, 2004 and 2005. In response, the government brought back universal subsidies on fertiliser in 2005/06 — much to the consternation of some donors.

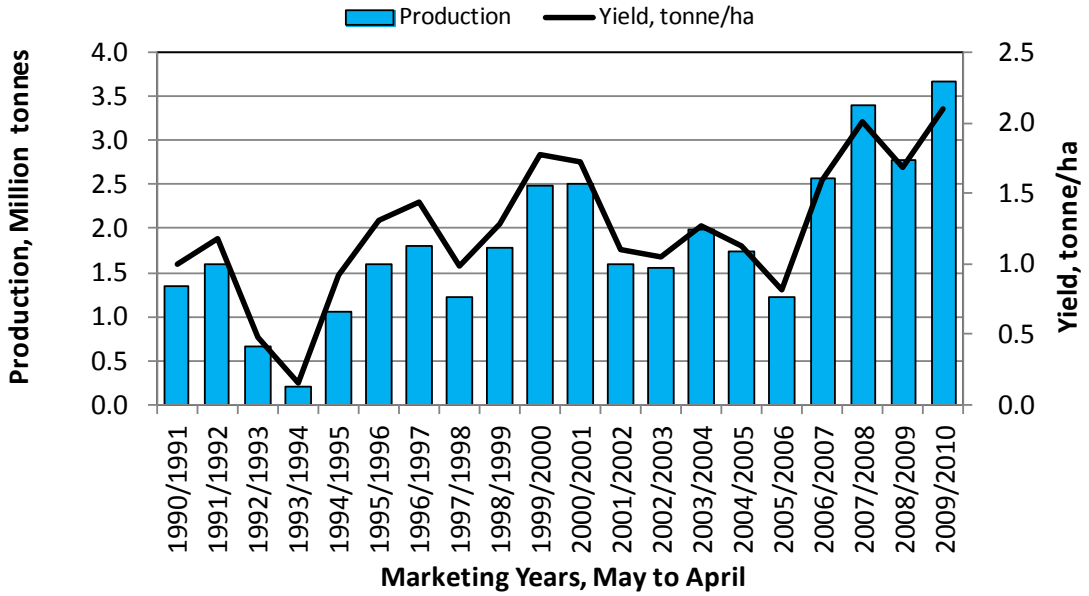
17. In 2006/07 two million seed and three million fertiliser vouchers were distributed to targeted households. The vouchers allowed recipients to buy two 50 kg bags of fertiliser at what was then 28% of

3. Main sources: FAC 2008, 2009; Dorward & Chirwa, 2011.

full cost. In total 175 000 tonnes of fertiliser and 4 500 tonnes of improved maize seed were distributed at a cost of USD 91 million. By 2008/09 182 300 tonnes of fertiliser for maize were made available with vouchers planned for 1.5 million households.

18. Judging the impact of the Malawi programme is complicated. Supporters point out that since the introduction of the subsidies maize production has increased remarkably (see Figure 6), with harvests exceeding the estimated national requirement of around 2.4 million tonnes. While some of the production increase in the last four years may be the result of favourable rains, it would be hard to deny the impact of the subsidies.

Figure 6. Malawi: maize production, 1990 to 2009



Source: USDA data.

19. The programme, however, has not been without difficulties. Targeting has been imperfect, and some of the vouchers have been distributed to political supporters. Although vouchers are used, fertiliser has been distributed by a state company in recent years, marginalising small private dealers in rural areas. Politically, parties have promised to increase the programme, recognising it as a vote winner, regardless of the economic merits of expansion. The cost of the programme has been rising as well: to more than USD 200 million during 2008/09, representing 16% of the total government budget. This is partly due to expansion of the programme, but more the rise in world fertiliser prices, which led to an increase in the unit value of the subsidy.

20. Measuring impacts more precisely is complicated by questions about what might have happened without the subsidies — not all the fertiliser distributed was additional, with estimates of 20–30% displacement of commercial sales in some years — as well as by consideration of second round effects on maize prices, rural employment and wages, when dealing with a crop that is so central to the economy. Since transport costs from Indian Ocean ports to Malawi are substantial, there is wide band between import and export parity prices for maize in Malawi: unless harvests fail badly, the domestic price for maize is largely determined by the size of the domestic harvest. Hence higher maize production has the potential to bring down domestic prices, to the benefit of low income consumers, including very small farmers, who

are usually net buyers of grain. Maize prices in the last few years, however, have been surprisingly high given the bumper harvests, even when taking some limited exports into account.[4]

21. There are, however, reports of more maize being available in villages, of rising rural wage rates, and of reduced rural poverty. Fertiliser importers have benefitted from increased public procurement. But for local retailing dealers, the impacts have been mixed: they may have sold more improved seed, but they have lost sales of fertiliser owing to displacement by subsidised sales — this was not inevitable, but the result of administering distribution through public channels rather than the private local dealers.

22. Overall, the judgment on the Malawi experience turns on how effective the fertiliser subsidy has been in raising the harvest and the second-round effects this has had in a low-income economy where staple food production has significant effects on both rural employment and the cost of living. In this regard, the particular circumstances of Malawi need to be taken into consideration: high levels of rural poverty; few sources of rural employment other than agriculture, and not many jobs in urban areas either; weakly developed rural markets for inputs, credit and insurance; low incomes throughout the economy so that staple food makes up a significant share of the cost of living; and remote location from world markets so that domestic harvests largely determine domestic price of maize.

4.2. Sri Lanka's subsidies on fertiliser for paddy farmers

23. Sri Lanka has subsidised the cost of fertiliser, with a short interruption in the early 1990s, since 1962;

> ' … with the intention of encouraging the use of fertilisers and off-setting the effects of low crop prices and high costs of production.' (Tibbotuwawa, 2010)

24. The programme since 2005 ensures that rice paddy farmers can obtain fertiliser at a fixed price, the government paying a subsidy to importers to cover the difference between the fixed price and the imported cost. In 2010 the price of a 50 kg bag of fertiliser was reported as just USD 3.07: a 93% subsidy on the cost of urea[5] (Tibbotuwawa 2010). Total cost to Sri Lanka has risen to reach USD 570 million, or 3% of gross domestic product.

25. How effective is this very heavy subsidy? For production, the questions are the extent to which the subsidy encourages additional use of fertiliser and does not simply replace what would have been bought commercially. Some studies show a low responsiveness of fertiliser use on paddy rice to the price of fertiliser. Kikuchi & Masao (1990) estimated that removing the fertiliser subsidy would reduce rice yields by only 1%–2%, since nitrogen demand was relatively inelastic with respect to price. This conclusion was supported by Ekanayake (2006), who found low elasticity of fertiliser prices on consumption for the three main fertilisers. In his analysis the price of rice was more important in determining fertiliser use than own price of fertiliser.

26. The subsidy is targeted to rice farmers — although there are reports of leakage to vegetable growers — with no restrictions on the amount sold with subsidy. The World Bank (2003) estimates that about 51% of the total rice area is cultivated by households in the top 40% of the rural expenditure

4. Dorward & Chirwa (2011) discuss why this has happened, breaking with a previous pattern where larger harvest invariably led to lower prices. It may be that demand has been stimulated since the increased production of maize has helped reduce poverty. There remains the possibility that harvests have been over-estimated.

5. Subsidies on triple super-phosphate and muriate of potash are even larger, since these also sell at just over USD 3 a bag, but are more expensive on world markets than urea.

quintiles while only 25% is cultivated by the households in the lowest two quintiles. Hence as a way to transfer income to the poor, the subsidy appears a blunt instrument.

4.3. India's subsidies on fertiliser, irrigation water and rural electricity

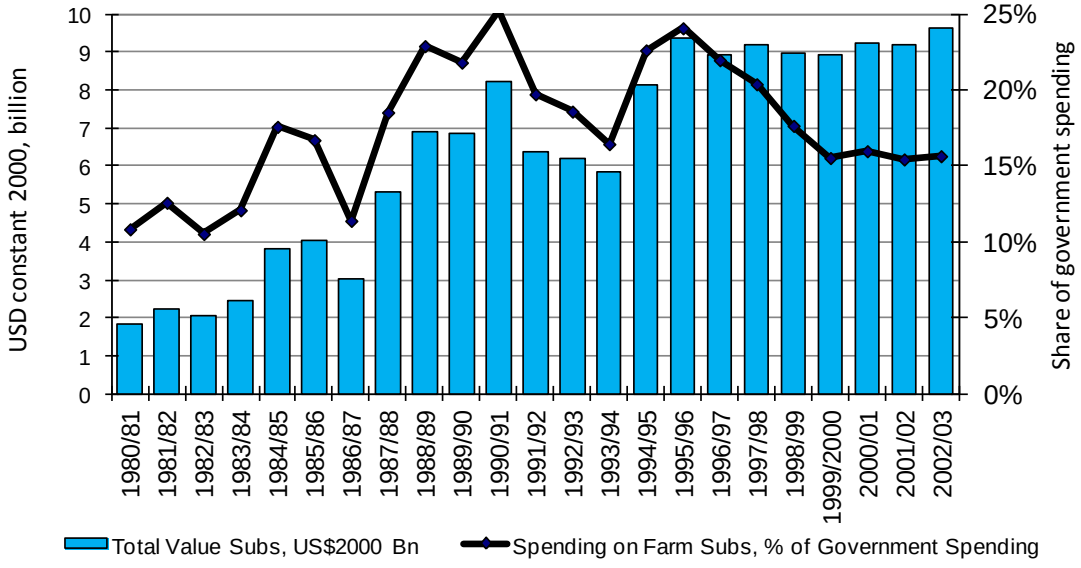
27. India originally introduced subsidies in the 1960s to support the green revolution, with major spending to keep down the costs of fertiliser, irrigation water from public systems, and rural electricity — that drove many of the private irrigation pumps attached to wells. In addition India nationalised the main banks and directed them to provide credit to farmers at concessional interest rates.

28. While studies (Dorward *et al.*, 2004; Smith & Urey, 2002) suggest that during the early phases of the green revolution payment of subsidies on inputs contributed to rapid expansion of production of cereals and thereby to poverty reduction, subsequently it is less clear that the subsidies have continued to do so.

> Input subsidies also became a major feature of policy and were valuable to farmers faced with declining output prices in the 1980s. They were not, however, key determinants of technology adoption and became damaging when they crowded out capital investment in research, infrastructure and human capital as fiscal constraints began to bite under structural adjustment reforms. They may also contribute to environmental degradation, and to the extent that wealthier farmers and regions largely captured them they had little direct influence on poverty.
>
> (Smith & Urey, 2002)

29. Meanwhile since the early 1980s the costs of the subsidies have increased notably — see Figure 7, rising to between 15% and 25% of the government budget, more than is spent on education — in a country where adult literacy is only 61%.

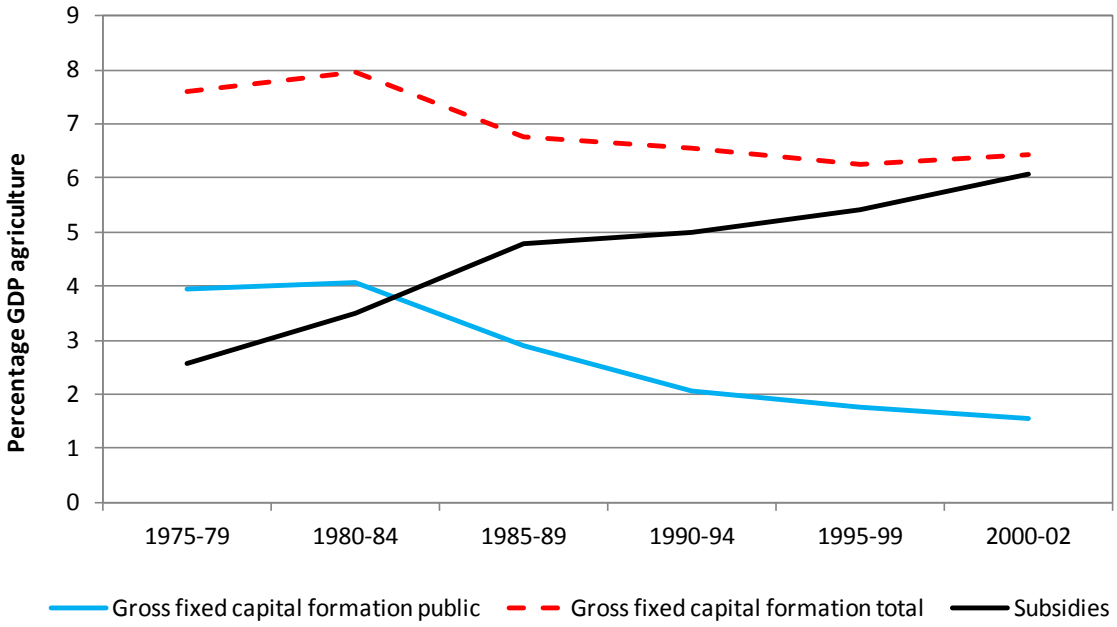
Figure 7. India: Cost of agricultural subsidies, 1980/81 to 2002/03



Source: Mullen *et al.,* 2005.

30. Since the mid-1990s agricultural production increases have slowed, apparently for lack of investment in physical infrastructure, research and extension. The fear is that the cost of the subsidies has crowded out other public investments, as Figure 8 would indicate.

Figure 8. India, spending on subsidies compared to public goods



Source: Chand & Kumar, 2004.

4.4. Lessons from these cases

31. Evidence from case studies of India, Malawi and Sri Lanka suggests that subsidies have had an impact over the short to medium term, promoting input use, raising output and thus reducing poverty. The programmes have been costly, although the absence of a counter-factual makes it difficult to evaluate whether the same benefits could have been achieved at a lower cost with alternative instruments. It is also possible that, because of high budgetary costs, the pursuit of other objectives, for example in the areas of health and education, has been compromised.

32. A major question mark hangs over whether the benefits of the programmes have been enduring, in the sense that they have led to a sustained increase in incomes that would survive removal of the subsidy. Experience from India is that there were early returns during the Green Revolution, but the subsidies became increasingly ineffective as they were not complemented by deeper investments to improve agricultural productivity and strengthen the rural economy. Hence there was relatively weak progress in facilitating the agricultural transformation and raising rural incomes. In general, for subsidies to have had any long-term effect, they require complementary investments to make input use profitable, for example in rural roads, agricultural research and extension, and in some cases irrigation. Indeed, the extent of adoption of high-yielding varieties and use of irrigation may have more influence on the amount of fertiliser used than the price of fertiliser.

33. There is also evidence that the benefits of input subsidies are higher in the early stages of provision, as farmers increase their use of external inputs from a low base. They are markedly lower once a certain level of use has been achieved, agricultural production is greater and markets have become wider. Furthermore, the tendency is for costs to rise, for the subsidies to increasingly displace government spending in other areas, and for them to become a source of income transfer from which the government has difficulty extracting itself. Hence they can pass from being a help to becoming a hindrance to agricultural development.

34. The effectiveness of input subsidies will depend on specific market conditions and the way in which the subsidy programme is implemented.[6] Evidence from Sri Lanka suggests that fertiliser use might not be sensitive to price (in which case the subsidy simply replaces commercial sales). An open-ended subsidy is also favours larger producers, making it a poor instrument for tackling poverty. Effectiveness may also be constrained by design features. For example, the state's distribution of vouchers in Malawi has led to a diminished role for private dealers. Issues relating to the design and operation of input subsidy programmes are taken up in the next section.

5. Design of subsidy programmes

35. Much of the effectiveness of subsidies depends on how programmes are designed and operated. Considerations and options that arise include:

- Targeting: Should the subsidies be offered to all users, or targeted to specified farmer either on efficiency or social policy grounds, or for a combination of both? Possible criteria for targeting are farm size, location, via means-testing for poverty, production of particular crops. Targeting can make subsidies more likely to achieve their goals economically, but may be administratively costly and prone to leakages.
- Similar to targeting is the imposition of conditions on receipt of subsidy, such as use on particular crops, application according to specified techniques, or conditional on selling a set quantity of output to the state. These may improve the focus of the subsidy on the intended aims, but raise the costs of administration and monitoring for compliance.
- Rationing: the subsidy may apply to all of the input, or to a limited quantity for each farmer. This can thus become a way of targeting: if farmers are entitled to just a few bags of seed or fertiliser per farm, in effect the subsidy has much greater incidence on smaller and presumably poorer farmers, compared to larger farmers.
- The form in which the level of subsidy is specified. Subsidies may be computed as a percentage of cost, may be a fixed amount per unit volume of subsidy, or may hold the price of the input at a given level, that may be indexed to inflation or not. In the last case, holding the price constant risks seeing the subsidy bill rise when input prices rise, and it reduces the predictability of public spending.
- Point of provision of subsidy. Should it be paid to importers, wholesalers or retail dealers, or given to farmers in the form of vouchers? The higher up the chain, usually the fewer payments have to be made, which implies administrative savings, but with the danger that the subsidy will not be fully passed on to farmers. Providing farmers with vouchers ensures that the subsidy goes to the beneficiaries, but reaching hundreds of thousands of small farmers can be a major administrative exercise that takes up much of the time of extension staff.
- Distribution of subsidised fertiliser. Should the subsidy be supplied by private dealers, by co-operatives, or distributed by a state agency. Using state agencies can make it easier to target beneficiary farmers, areas or crops; but may inhibit the development of private marketing. State agencies may also have little incentive to reduce logistical costs.
- Duration of the subsidies. They may be limited in time, particularly when they aim to promote learning of use of inputs; or they may have no time limit.

6. See background paper for a discussion of implementation issues, including alternative approaches to targeting (including rationing), the conditions under which a subsidy should be provided, the point at which the subsidy should be provided, the means of provision (including vouchers) and the time frame over which the subsidy should be in operation.

36. Much depends on what the subsidy is intended to do. Table 1 draws the implications of different aims for programme design. Although the various motives can be broken down as shown, however, in practice more than one aim may apply. There is a risk, however, when a single policy is justified by more than one aim. While a single aim may allow the policy instrument to be designed specifically for that purpose, when there are several objectives the instrument tends to become the lowest common denominator that will serve all.

37. That would not matter if all aims were equally important and all achieved at the same time; but that is not the case. A policy that was originally introduced to meet several objectives may remain largely unchanged, even when most objectives have been met and the remaining aims indicate that policy needs corresponding adjustment.

38. Programmes set up with multiple aims are an easier target for lobby groups: those interested in the continuation of the policy can usually find some reason or other from the original list to argue for this. Multiple objectives can make it more difficult to evaluate the programme with precision.

Table 1. Different aims for input subsidies, different implications

Aim	Implications for subsidy	Exit strategy	Alternatives and complements
Stimulate agricultural production	Target to farmers who make most use of inputs, perhaps those considered more competent, or those with better land and water	Only when a particular level of production has been reached, but could be unending	Improve marketing Invest in public goods for agricultural development, especially roads, irrigation and drainage, research and extension
Learning new technology	General subsidy; or target to non-users Only need to subsidise small amount of fertiliser: benefits should be visible on half hectare plot	Use until farmers see benefits from fertiliser: could be for as little as one or two seasons	Grant: distribution of trial packs of seed and fertiliser, sufficient for 0.1 ha or 1 acre. Permit fertiliser to be sold in small units: 5 kg or less
Improve soil quality	General subsidy	May be unending if fertiliser necessary to maintain soil quality and contain degradation	Soil erosion control through physical works and vegetation management Crop management practices to improve structure of topsoil, retain and recycle nutrients
Compensate for high transport costs	General subsidy, but may vary according to remoteness — potentially leading to pan-territorial pricing	When transport costs have fallen sufficiently	Invest in roads, ports, storage Encourage competition in transport, end cartels
Compensate for market too thin to achieve scale economies	General subsidy since all farmers suffer from market failure	Use until market works with lower T-costs having reached scale economies and overcome information failures When economies of scale in transport and distribution apply, then opportunity for easy exit: as volumes traded rise and logistical costs fall, sub can be progressively withdrawn while marked price to farmers remains constant. Requires careful monitoring by government to time reduction and eventual withdrawal of subsidy	Foster institutional innovations to reduce transactions costs Dealer training, public underwriting of trade credits May require additional public investments in roads, ports, storage.
Compensate for farmers too poor to afford inputs	Target subsidy to poor farmers	Use until poverty reduced amongst farmers	Stimulate financial services, including micro-finance and micro-insurance to allow poor to get inputs on credit Poverty reduction measures, including social protection
Social equity	Target subsidies to those who need help, by social groups, areas, or both	Exit when disadvantaged reach a threshold income level	Poverty reduction programmes Social protection and safety nets for disadvantaged, including: • Cash transfers • Pensions • Employment programmes

39. During the 2000s much has been said in favour of 'smart' subsidies (World Bank, 2007), that is programmes where subsidies are:

- ***Targeted*** to those farmers for whom inputs may be otherwise unaffordable — for example, poor farmers, farmers in remote areas;
- ***Work with the market*** to help develop commercially viable supply chains — for example, by giving farmers vouchers that they can redeem from input dealers; and,
- ***Limited in time***, until the market failures that justified the subsidy have been overcome.

40. These look like sound principles, although it is easy to see why they may not be followed. Administratively, targeting may be difficult and costly; and, if vouchers are distributed, there may be the need for complementary measures to ensure local dealers stock inputs — by providing, perhaps, trader credit. Politically there may well be pressure to make the benefits universal — apart from anything else, targeting can be socially and politically divisive if the criterion for access is a continuous and difficult to establish variable such as income, there may be distrust of the local dealers, and there will almost certainly be pressure to sustain the programme.

41. There is a close second-best to targeting: rationing, for example by limiting the volume of seed or fertiliser on which a farmer can receive a subsidy. This overcomes most of the administrative and political objections, while providing proportionately greater benefits of the subsidy to smaller and poorer farmers. The main objection to this applies if the subsidy is designed mainly to increase input use for higher production and it is argued that small farmers cannot make good use of the inputs.

42. Indexation of the subsidy may be one way of ensuring that the subsidy is time-bound and leads to the replacement of state action with private markets. When underdeveloped transport, storage systems mean that the farm-gate cost of inputs is high, a subsidy may allow use of inputs. If enough farmers adopt and use the inputs, then some of these costs may fall with economies of scale in transport, storage and distribution. Costs may be further reduced if there is sufficient spending on roads and ports with development. Hence it may be possible for low income countries with the characteristics described above to adopt a medium-term strategy that sees a subsidy set with respect to a price indexed to inflation that would allow the subsidy to decline as logistical costs come down. Hence the subsidy could become self-limiting in time, with input users not feeling the effects of the taper.

43. For this to happen, however, there has to be public investment in transport, and fertiliser distribution needs to be in the hands of private firms that have the incentives to reduce logistical costs. Is this wishful thinking? The Kenyan experience with liberalised fertiliser markets — see Box 1 — suggests that these costs can be reduced substantially.

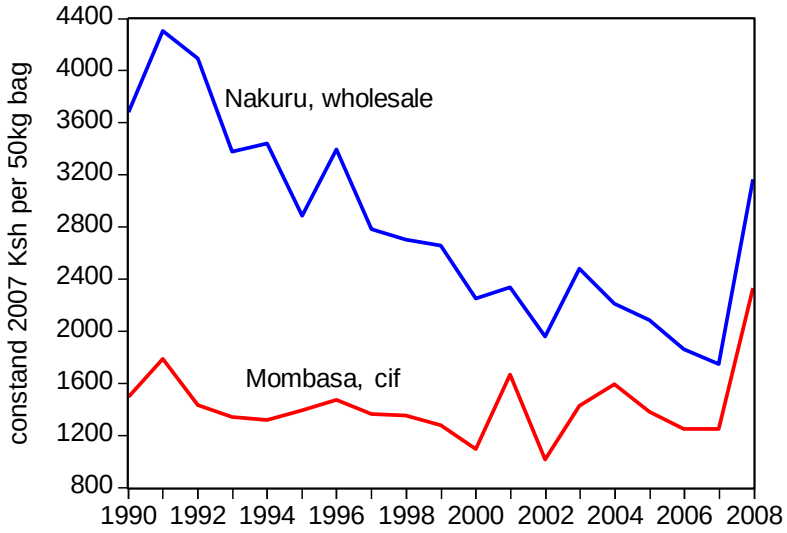
Box 1. Kenya's experience of liberalised markets

Fertiliser supply was liberalised in the early 1990s, when retail price controls, import licensing quotas, and foreign exchange controls were eliminated. At the same time donor fertiliser deliveries were phased out. Private response to liberalisation has been good.

The network of dealers has expanded, to reach 500 wholesalers and 7 000 retailers, so that the average distance from farm to dealer fell from more than 8 km to just over 4 km between 1997 and 2004.

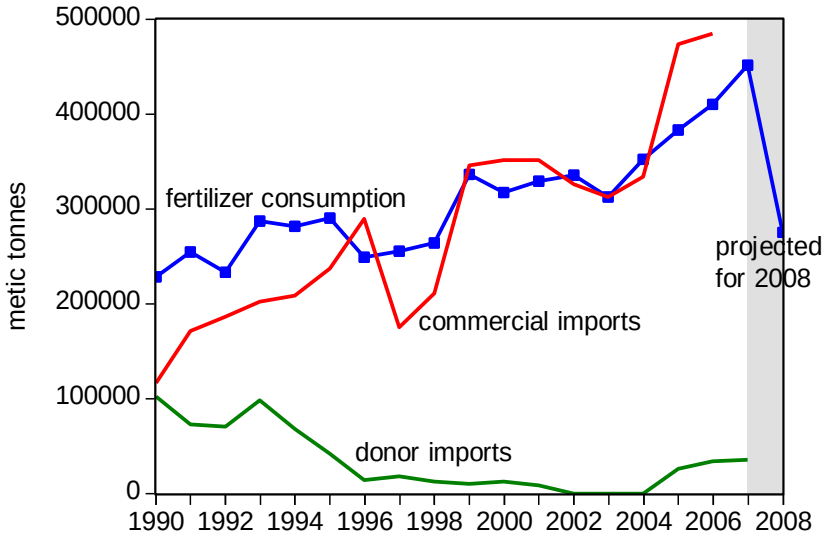
Improvements in logistics mean that the real cost of moving fertiliser from Mombasa to farms up country was cut by around 40% in real terms in the 1990s — see Box Figure 1.

Box Figure 1. Price of fertiliser at the port of Mombasa and in Nakuru, centre of main area of commercial maize growing



As a result, use of fertiliser has increased – see Box Figure 2.

Box Figure 2. Fertiliser consumption in Kenya, 1990 onwards



Especially noteworthy is that increased use of fertiliser has been common amongst small farmers, who make up most of those farming in Kenya. In 1995/96, 43% of smallholders used fertiliser, while by 2006/07 this ratio was 70%. The amount of fertiliser applied per hectare has risen, reaching 190 kg/ha on maize, a level comparable with other parts of the developing world and well above typical levels seen in other parts of Africa.

Increased fertiliser use has led to higher yields. Maize yields on small farms are up, from an average of 1.48 t/ha in 1997 to 2.1 t/ha in 2007. These yields may not seem so high, but much of the maize on small farms in Kenya is intercropped with other plants, such as vegetables. Hence these yields measure only part of the production of many fields.

While some of the fertiliser has been supplied under contract farming for sugar cane, and under schemes that integrate marketing, credit and inputs for tea and cotton, much of the fertiliser has been supplied in cash deals through private input dealers.

Not all is well: the smallest farms and poor farmers still find it hard to buy fertiliser for lack of credit. In response the government announced in 2007 a programme to subsidise fertiliser and maize seed sufficient for one acre, aiming to reach 2.5 million small farmers.

Source: Ariga & Jayne, 2009.

6. Conclusions

44. Input subsidies need to be contemplated with caution, with a clear consideration of the costs and benefits compared with conventional best practice of addressing market failures directly and using social policies to address social objectives with respect to poverty and food insecurity.

45. The technology transfer ("learning") argument is one that corresponds to best practice advice, because of its public good aspect. However, this calls for a relatively small time-bound subsidy. What is being proposed, particularly in Africa, is intervention on a much larger scale, and for a longer duration, than warranted by this objective. In general, input subsidy programmes are being developed to address the specific circumstances of countries at a low level of economic development, where there are:

- extensive and severe market failures with resulting poverty traps, so that any increased production has directly reduces poverty and raises human capability; and,
- locations where the food markets are naturally protected by distance from other markets, so that local prices will be driven down by increases in local production.

46. In these cases, a time-bound input subsidy may provide an alternative to failing markets, leading to more use of the input, with higher production that then raises the incomes of farmers, provides more work for agricultural labourers, and reduces the cost of food, allowing those on the breadline to consume more and become more productive. The subsidy then could become an element in breaking through limits to growth and shifting both the agricultural and national economies to a path of faster growth.

47. In order to achieve these benefits, there will be a need for complementary spending on public goods. For agriculture, these usually consist of rural roads, agricultural research and extension, education, primary health care, and clean water. A further requirement is the establishment, or maintenance, of an adequate rural investment climate — including peace and political stability, a competitive exchange rate, low inflation, modest interest rates, fair taxes, and in general policies that allow investors to have reasonable confidence that they can carry out their business without undue hindrance now and in the near future.

48. In the longer run, however, it is much less easy to justify input subsidies. Indeed, they frequently become a millstone that eats into the funds for public goods and thereby undermines growth and development. Politically, once in place subsidies are difficult to remove.

49. If these difficulties are to be surmounted, there are important lessons that need to be absorbed. These lessons are reflected in the principles for "smart" subsidies, espoused by the World Bank and others. Subsidies should be targeted as effectively as possible, work with the market (for example by giving vouchers to farmers rather than have the state distribute subsidised fertiliser) and be time-bound (with indexation a possible way of avoiding an indefinite government commitment).

50. Above all, the rationale for using a subsidy needs to be kept clear. Despite the attraction, there is a fundamental difficulty in using a single instrument to address multiple market failure (*i.e.* long-term development) and social objectives. With respect to market failures, there needs to be an exit strategy. With respect to social objectives, on the other hand, there is a standing commitment to provide support until such a time as other social safety nets are put in place. This conflict has become a clear problem in India and Sri Lanka, where programmes have outlived their original rationale and become a budgetary millstone.

51. Finally, as far as possible, the use of input subsidies should not crowd out spending in other important areas, or compromise a long term approach of eliminating market failures – as opposed to offsetting them – and thereby getting private markets working.

REFERENCES

Ariga, Joshua & T.S. Jayne (2009), Private Sector Responses to Public Investments and Policy Reforms: The Case of Fertilizer and Maize Market Development in Kenya, Revised version 2: September 21, 2009.

Chand, Ramesh & Parmod Kumar (2004), 'Determinants of Capital Formation and Agriculture Growth. Some New Explorations', *Economic & Political Weekly*, 39(52) 25 December 2004, 5611–5616.

Crawford, Eric W., T. S. Jayne & Valerie A. Kelly (2005), 'Alternative Approaches for Promoting Fertilizer Use in Africa, with Particular Reference to the Role of Fertilizer Subsidies', *Paper*, East Lansing, MI: Department of Agricultural Economics, Michigan State University.

Dorward, Andrew & Ephraim Chirwa (2011), 'The Malawi Agricultural Input Subsidy Programme: 2005–6 to 2008–9', Forthcoming (after further editing): *International Journal of Agricultural Sustainability* (IJAS), January 2011, 9 (1).

Dorward, Andrew, Shenggen Fan, Jonathan Kydd, Hans Lofgren, Jamie Morrison, Colin Poulton, Neetha Rao, Laurence Smith, Hardwick Tchale, Sukhadeo Thorat, Ian Urey & Peter Wobst (2004), 'Institutions and Policies for Pro-poor Agricultural Growth', *Development Policy Review*, 22 (6): 611–622.

Dorward. Andrew (2009), Rethinking Agricultural Input Subsidy Programmes in a Changing World, Draft for FAO, February 2009.

Ekanayake, H. K. J. (2006), 'The Impact of Fertilizer Subsidy on Paddy Cultivation in Sri Lanka', *Staff Studies* 36 (1& 2), 73–101.

FAC (2008), The Malawi Fertiliser Subsidy Programme: Politics and Pragmatism, *Briefing Paper* by Blessings Chinsinga, February 2008, Brighton UK: Future Agricultures Consortium.

FAC (2009), Fertiliser Subsidies: Lessons from Malawi for Kenya, *Briefing Paper*, February 2009, Brighton UK: Future Agricultures Consortium.

Kikuchi, Masao & P. B. Aluwihare (1990), 'Fertilizer response functions of rice in Sri Lanka: estimation and some application', Colombo, Sri Lanka: International Irrigation Management Institute.

Mullen, Kathleen, David Orden & Ashok Gulati (2005), 'Agricultural policies in India. Producer support estimates 1985-2002', *MTID Discussion Paper 82*. Washington, DC: International Food Policy Research Institute.

OECD (2001), *Market Effects of Crop Support Measures*, OECD, Paris.

Smith, L.E.D. & I. Urey (2002), 'Agricultural Growth and Poverty Reduction: A Review of Lessons From the Post-Independence and Green Revolution Experience in India', *Report* written as part of a research project on Institutions and Economic Policies for Pro-poor Agricultural Growth, funded by the Department for International Development of the United Kingdom (ESCOR Project R7989). Wye, Kent: Department of Agricultural Sciences, Imperial College at Wye.

Tibbotuwawa, Manoj (2010), 'Better Targeting of Transfers: The Fertilizer Subsidy', Talking economics blog, Monday, August 16, 2010: at http://ipslk.blogspot.com/2010/08/better-targeting-of-transfers.html.

World Bank (2003), "Sri Lanka Promoting Agricultural and Rural Non-farm Sector Growth", Report No. 25387-CE.

World Bank (2007), *World Development Report 2008; Agriculture for Development*, Washington, DC.