

The rehabilitation of agricultural input subsidies?

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In recent years large-scale agricultural input subsidies have had a contested ‘rehabilitation’ in sub-Saharan Africa. This paper reviews the changing paradigms, politics and theories associated with input subsidies’ decline and rise, and the implementation and impacts of recent large-scale programmes. Empirical evidence is patchy, and their impacts contested and dependent on context, design and implementation. Few programmes have lived up to expectations or achieved acceptable benefit cost ratio estimates . The paper discusses how such programmes can improve and realise their full potential, to deliver major dynamic benefits to smallholder farmers and the wider economies of which they are a part.

Contents

Summary	4
1 Introduction	6
2 The 1960s and 1970s	8
3 The 1980s and 1990s	10
4 The 2000s and 2010s	11
4.1 The context	11
4.2 Rethinking subsidies’ roles and modalities	11
4.3 Input subsidy implementation in Africa	16
4.4 Input subsidy impacts in Africa	17
5 Conclusions	20
References	22

Summary

Large scale agricultural input subsidies, a component of state-led agricultural development policy toolkits in the 1960s and 1970s, became deeply unfashionable in the market-led policy thinking that dominated international development thinking and practice in the 1980s and 1990s. They never lost, however, the interest and support of many people and politicians in a number of low and lower-middle income countries, and from the mid-2000s have enjoyed a somewhat controversial revival in a number of countries in sub-Saharan Africa (SSA).

This paper examines the changing fortunes of agricultural input subsidies in development policy, thinking and practice and what we can learn from this regarding the roles of such subsidies in rural and wider development in different African countries. We review changes in agricultural input subsidy policies in developing countries, together with the reasons for these changes and their impacts, recognising that policy design, choice and implementation seldom follow neat processes based on rational consideration of goals and evidence: instead policies emerge from and evolve within messy interactions between ideologies, the power and interests of different groups, selective generation and use of evidence, and 'events'.

The paper considers three broad historical periods that differ in their dominant input subsidy policy dynamics, with changing dominance of ideas and perceptions and critical events shaping national and international political economies relevant to input subsidy policies in (predominantly) low income countries. We discuss the ways that evidence and theory interact with each other and with the contested and changing sets of ideas and political economies (national and international) within which they are situated. Of particular importance is the recent emergence of and interaction between

- Reappraisals of the beneficial roles of conventional input subsidies in the 'Green Revolution' that largely bypassed Africa in the 1960s and 70s.
- New thinking on rationed, targeted and market friendly programme designs, so called 'smart subsidies'.

- Adoption in a number of African countries' of large scale programmes with distinctive characteristics which draw on some components of 'smart subsidy' design.

We review the patchy empirical evidence on experience with the implementation and impacts with these recent large scale input subsidy programmes. Few if any programmes have lived up to expectations as regards their market friendly, targeted design and implementation. Estimates of economic impacts are limited, variable and context dependent. While impacts are generally below expectations, some have yielded significant benefits, though the extent of these is disputed, as are subsidy programmes' efficiency in delivering these benefits. Nevertheless it is widely accepted that whatever their merits and demerits, subsidy programmes are likely to be a major and continuing feature of agricultural development policies in many countries in Africa for a variety of political and other factors (their high visibility, popularity with rural populations, potentially rapid results, and opportunities for political and other patronage).

If this is the case then strenuous efforts should be made to improve their effectiveness and efficiency. Principal means of achieving this through better context-specific design, implementation and complementary policy and investment coordination are discussed. These include

- Restriction to beneficiaries and livelihood systems with constrained access to affordable inputs with potential for high productivity impacts
- Improved targeting and rationing systems,
- Improved systems for lower cost and timely input acquisition and distribution
- Subsidy rates that are fiscally affordable and minimise displacement of unsubsidised input purchases while making incremental purchases affordable to target beneficiaries
- Development of competitive input supply systems
- Better systems to control fraud

- Transport infrastructure, agricultural research and extension investments to lower input costs, promote and raise the sustainable productivity of inputs on farmers' fields and improve input and output market access.
- Integration of these programmes into wider and consistent, long term national economic growth and development policies including necessarily long term consideration of ways of promoting sustainable graduation and reduction in programme scale and costs
- Better integration with social protection programmes

With such efforts, agricultural input subsidy programmes can in the right context yield substantial developmental benefits. Without such efforts, however, there are major risks of high costs and limited benefits and poor returns to very large investments.

Three further issues are raised. First the remarkable lack of attention to but major relevance of climate change and rapid population growth in debates about the impacts of input subsidies. Second, the need to recognise valid concerns that subsidy programmes frequently appear to increase dependence on inorganic fertilisers and the dominance of crops like maize – but to also recognise their potential to provide poor smallholder farmers with the opportunity to diversify out of low-productivity staple crop production. Finally, the considerable and justifiable concerns that political economy processes mean that once agricultural subsidies are put in place they are very difficult to remove. We argue, however, that notwithstanding the need to control and reduce subsidy expenditures to match their benefits, it may be better to be less poor in a less poor society with liabilities from a history of once successful subsidies than poor in a poor society without such liabilities. This reiterates the importance of making sure that input subsidy programmes are implemented as well as possible and only in situations and with complementary policies where they will indeed play a significant part in helping poor people and societies become less poor.

1

Introduction

Agricultural input subsidies, a component of state-led agricultural development policy toolkits in the 1960s and 1970s, became deeply unfashionable in the market-led policy thinking that dominated international development thinking and practice in the 1980s and 1990s. They never lost, however, the interest and support of many people and politicians in many low and lower-middle income countries, and from the mid-2000s have enjoyed a somewhat controversial revival in a number of countries in sub-Saharan Africa (SSA).

This paper examines the changing fortunes of agricultural input subsidies in development policy, thinking and practice and what we can learn from this regarding the roles of such subsidies in rural and wider development in different African countries. We examine changes in agricultural input subsidy policies in developing countries, together with the reasons for these changes and their impacts, recognising that policy design, choice and implementation seldom follow neat processes based on rational consideration of goals and evidence: instead policies emerge from and evolve within messy interactions between ideologies, the power and interests of different groups, selective generation and use of evidence, and 'events' (Acemoglu and Robinson, 2012).

The paper therefore considers three broad historical periods that differ in their dominant input subsidy policy dynamics. For each period we discuss the dominant sets of ideas and perceptions and the critical events that shaped national and international political economies relevant to input subsidy policies in (predominantly) low income countries together with changes in the main theories and empirical understandings of subsidy policies' drivers and impacts. In this we recognise that evidence and theory interact with each other and with the contested and changing sets of ideas and political economies (national and international) within which they are situated.

Table 1 provides a summary of the main elements in changing input subsidy policies from the 1960s to the present. Wide variation between regions and countries precludes any attempt to detail national sets of ideas or political economies. International political economy in each period is represented to some extent by information provided on context and prevailing international thinking, although this is contested, for example among different bilateral and multilateral agencies and between what Kanbur (2001) loosely terms the 'Finance Ministry' and 'Civil Society' paradigms.

Table 1. Main elements in changing input subsidy policies from the 1960s

	1960s–1970s	1980s–1990s	2000s–2010s
Events/ context	Post-colonial Cold War Oil crisis	End of Cold War Low income countries' debt crisis	Perceptions of earlier agricultural stagnation in much of SSA Global food & fertiliser price spikes HIPC debt relief & budget support Democratisation
Prevailing ideas	State-led development	Washington Consensus, private sector & markets, liberalisation & structural adjustment, conditionality	Neo-liberalism, post Washington Consensus, MDGs, growth of NEPAD & CAADP in Africa
Subsidy & other policies	General price subsidies, Asian GR policies, African Integrated Rural Development Programmes & parastatals	Continuation in post-GR Asia Scaling back, partial/ intermittent removal in SSA	Continuation in post-GR Asia Resurgent interest & rehabilitation as 'smart' subsidies in SSA
Perceived subsidy impacts	Part of major successes in Asian GR? Part of major failures in SSA? Some temporary successes in SSA?	Ineffective & expensive in post-GR Asia & where continued in SSA – mainly rents Some temporary successes in SSA?	Ineffective & expensive in post-GR Asia Limited, mixed & contested evidence of impacts in SSA
Theory	Temporary boost to profitability to address information failures, with other investments & subsidies	Rent seeking the dominant reason for continued inefficient subsidies Recognised that subsidies also used to counteract negative effects of other (eg exchange rate support) policies	Rent seeking a major issue. Contested analyses of positive impacts in GR Asia Potential role for temporary 'smart' subsidies to promote input supply systems. Roles in addressing affordability constraints, food price tightrope & wider growth stimulus

2

The 1960s and 1970s

The first historical period that we consider is the 1960s and 1970s. International relations during this period were dominated by the Cold War, and western development assistance included a strong emphasis on state-led support to smallholder agriculture. Agricultural input and credit subsidies were a major component of the agricultural development toolkit used in many Asian and African countries during this period. These policies were based upon widely accepted promotion of technical change in smallholder production through the use of modern inputs (mainly high yielding seeds and fertilisers) with irrigation (where possible) to drive large land and labour productivity increases. Smallholders' uptake of these technologies was considered to be constrained by lack of knowledge of the benefits of these technologies, lack of knowledge of their effective use, lack of working capital for input purchase and infrastructural investments, and lack of infrastructure and markets for the profitable extraction of production from surplus areas. These policies and the changes in technology they promoted led to dramatic and sustained increases in production of rice and wheat in irrigated so-called 'Green Revolution' (GR) areas in South and East Asia and in Mexico (eg Lipton and Longhurst,

1989; Timmer, 1989; Rosegrant and Hazell, 2000; Hazell, 2009). Results in Africa were, however, less exciting, with uptake of new technologies in fewer areas and limited increases in productivity (Table 2 shows somewhat lower estimates of annual cereal growth in sub-Saharan Africa compared with other developing regions, although this masks very low reported growth rates in the 1960s and higher rates in the 1970s, not shown in the table).

General input price subsidies were used to raise the profitability of input use to address constraints on input adoption from farmers' lack of technological knowledge on the efficient use of purchased inputs and lack of financial and economic understanding of the potential returns to their efficient use (Ellis, 1992; Crawford et al., 2006; Morris et al., 2007). It was thought that farmers' lack of technical knowledge and of financial and economic understanding of input use would then be overcome with experience of input use, and consequently subsidies could be withdrawn, with farmers then continuing to apply inputs on the basis of their better knowledge of the methods and benefits of input use. The long-term benefits of higher

Table 2. Estimated annual cereal yield growth by region from the 1960s onward

	1960s & 1970s	1980s & 1990s	2000s
East Asia & Pacific	3.31	2.21	1.08
Latin America & Caribbean	1.69	2.44	2.57
South Asia	1.66	2.62	1.70
Sub-Saharan Africa	1.32	0.32	1.85

Notes: Countries of all income levels in each region. Three-year moving averages 1961–1980, 1980–2000 and 2000–2010

Source: Authors' calculations from World Bank, 2014

input use would then substantially outweigh the administrative costs and deadweight losses during the subsidy implementation.

A number of problems with general input price subsidies were also recognised:

- First, subsidies should only promote effective and efficient input use that will later become profitable without subsidies. They should not be applied to inputs and technologies that are not fundamentally profitable (due for example to underlying shadow costs and prices within the economy, or to unfavourable production conditions such as poor soils and rainfall).
- Second, subsidies should not be continued after farmers have learnt about the use and benefits of inputs, as they will then encourage farmers' over-use of inputs, incurring deadweight and administration costs and also potential environmental costs (for example from pollution or resource depletion from over extraction of resources).
- Third, transfers to producers were also analysed in terms of inefficiencies associated with economic rents, arising in three ways:
 - Rents are received by producers who benefit from the subsidy when they would have purchased inputs anyway without the subsidy. This is an inefficient way of stimulating increased production and productivity.
 - Rents also arise because subsidies often affect demand for agricultural land and labour as well as for inputs. If the supply of land, labour or inputs is inelastic then increased demand will push up land, labour and/or input prices and apparent transfers to producers may then be passed back to the suppliers of these factors of production as pure economic rents. This is not a problem if the providers of this land and labour are poor, and it is argued later that this can be an important way for subsidies to promote pro-poor growth.
 - A third form of rents arises where the supply of subsidised inputs does not match demand and subsidised inputs are therefore (officially or unofficially) rationed. This leads to opportunities for those controlling subsidised inputs (eg politicians, government officials, fertiliser suppliers and farmer organisation office bearers) to divert subsidised inputs from the intended beneficiaries for a side payment or to demand payments from beneficiaries in return for provision of subsidised inputs.

The first two points above identify conditions under which subsidies are **not** likely to generate significant net benefits, and identifies significant dangers in their use. The analysis of rents (the last three points above) then highlights particular difficulties for input price subsidies. The first two types of rent mean that there are inherent inefficiencies in the provision of subsidies to existing producers and there may also be inefficiencies in the accrual of benefits to suppliers of land, labour and inputs. This leads to questions about other possibly more efficient ways of overcoming producers' lack of knowledge about input use and its benefits. All three types of rent mean that there may be particular stakeholders with strong interests in the initiation and continuation of input subsidies. The latter point suggests that there will often be strong interest groups that resist the discontinuation of subsidies after they have served their purpose (in enabling farmers learning about the input use and its benefits). These interest groups may also not be concerned about the effectiveness or efficiency of subsidies' design and management in serving wider economic goals or about the negative effects of subsidies in distorting markets and crowding out private sector investments.

The capture of rents by existing producers raised further difficulties with general input price subsidies as it was difficult to channel subsidised inputs to poorer smallholders needing and responding to the subsidy unless there were a limited number of tightly controlled supply chains, clear ways of identifying intended beneficiaries and control of private fertiliser transactions¹. The existence of these controls, however, increased the scope for rent seeking from rationing and promoted market distortions, and particularly parastatal involvement in subsidised input delivery, tending to crowd out and inhibit private sector investment in input supply systems and hence impede sustainable development. The absence of such controls, on the other hand, led to rents (of the first kind discussed above) for larger-scale commercial farms and richer smallholders at the expense of poorer smallholders whose input use was the most constrained by lack of knowledge of input use and benefits. This then led to regressive benefits (favouring larger rather than poorer farmers).

¹ Such systems were used effectively in Malawi in the late 1970s to channel subsidised fertilisers to smallholders, although not to the poorest smallholders Chirwa and Dorward, 2013.

3

The 1980s and 1990s

The 1980s saw continuing effects from the mid-1970s' oil and commodity price spikes, and the ensuing fiscal and debt crises for many developing countries exposed the weaknesses of expensive and often ineffective large governments and interventionist policies. With shifts in global relations with the end of the Cold War in 1991, international development policy turned away from state-led models to 'Washington Consensus' reliance on liberalised markets and specific redirection of public spending away from subsidies (Williamson, 1989).

Three other influences were important in this context: the ascendance of neo-liberalism with pursuit of market solutions and rolling back of the state, particularly in the US and UK; increasing recognition of problems with agricultural subsidies in growing economies in Asia; and widespread recognition of problems with ineffective, unsustainable and indeed often counter-productive state intervention in Africa. A specific concern with subsidies was the recognition of major distortions from large US and EU subsidies, and of the rent seeking and political forces that led to their continuation despite their problems (as discussed earlier). In GR areas in Asia, continuing subsidies, which had originally stimulated nascent demand now led to excess demand and use, at great cost to the state and with damaging environmental and natural resource impacts.

With regard to Africa, agricultural subsidies were identified as a major element in inefficient and fiscally and economically unsustainable policies which undermined private sector services growth, distorted market incentives and blunted competitiveness and farmer incentives (World Bank, 1981): inherent subsidy inefficiencies, inefficient implementation and capture of rents by others led to very limited benefits to farmers and indeed net costs. It was also found that many developing countries were implementing wider policies that distorted incentives (such as prices) in ways that harmed farmers (for example exchange rate support reducing export and import prices) and it was argued

that removal of these distortions would be more effective than subsidies in promoting agriculture (Krueger et al., 1988). There were, nevertheless, some African countries (eg Zimbabwe and Malawi) that implemented subsidy systems that, with other interventions, initially succeeded in raising productivity but for varying political and economic reasons (including inefficient implementation and the withdrawal of donor support) failed to either maintain the fiscal investment and market systems needed for sustained benefits, or to develop unsubsidised alternatives (Smale and Jayne, 2009).

These short-lived successes did not affect the dominant international perspective of Asian and African subsidies in this period. This drew on the analysis of rents and rent seeking developed earlier, suggesting that these forces were so powerful and the costs of subsidies so high and so difficult to control that subsidies were not a feasible or viable policy instrument. These views matched a wider perception, at least in Africa and Latin America, that it was very difficult to get good development returns from investments in smallholder agriculture, and there was an overall reduction in emphasis on agriculture with falling agricultural investments during the 1990s.

Despite input subsidies' loss of favour in the Washington Consensus and consequent attempts to eliminate such subsidies in agricultural liberalisation and structural adjustment programmes across Africa, input subsidies continued in many African countries, largely as a result of national political interests. This at times coincided with a shift towards increasing democratisation in many countries – Malawi provides an interesting example of this (Harrigan, 2003; Chirwa and Dorward, 2013). Where input subsidies did continue, however, they were generally scaled back and were no longer part of integrated policy programmes involving credit subsidies and parastatal controls and engagement in input and output marketing.

4

The 2000s and 2010s

4.1 The context

The early 2000s were characterised by continuing processes of democratisation in Africa, leading to both changes in the political economy within African countries and changes in relations with international donors as this democratisation questioned the legitimacy of external policy prescriptions (with donors also recognising difficulties with aid conditionality and, in the 2005 Paris Declaration, committing to more partnerships with and accountability to national governments). There was also continuing and growing disquiet about the lack of apparent growth in many African countries, particularly in staple food crop production (Table 2). Large numbers of poor rural people meant this was a political issue in many countries, while the Washington Consensus of the 1990s evolved into a neo-liberal 'post Washington Consensus' that placed more emphasis on the development of institutions needed to 'make markets work for the poor'. This emphasis matched the increasing importance of the Millennium Development Goals (MDGs), and particularly of MDG1 (income poverty reduction) during this period – although the MDGs were otherwise remarkably 'light' in their emphasis on economic growth (Waage et al., 2010). The budgetary resources of African countries also improved with debt relief and with a move among international donors towards greater use of budgetary support in financial aid flows.

Within Africa, the formation under the African Union of the New Partnership for Africa's Development (NEPAD) and within that of the Comprehensive Africa Agricultural Development Plan (CAADP) complemented changing relations between African countries and the international community, and provided a focus for renewed emphasis on agricultural development policy. This followed the 2003 African Heads of State 'Maputo Declaration on Agriculture and Food Security' in which countries

pledged to allocate, within five years, 10% or more of national budgets to agriculture and rural development. Although achievement of this has been patchy, it signifies the growing political importance of agriculture in many countries.

Of more specific relevance to input subsidies was the 2006 'Abuja Declaration on Fertilizer for the African Green Revolution'. In this African Ministers of Agriculture committed to substantially raise the very low rates of fertiliser use across the continent with measures to reduce costs of fertiliser acquisition and supply; improve smallholder access by scaling up private sector and other supply networks; provide targeted fertiliser subsidies and invest in infrastructure, supplier finance and complementary seed and soil services; and improve trade flows (Africa Fertilizer Summit, 2006). These Africa-wide commitments both reflected and sought to drive changing national policies on agricultural input subsidies. Interest in food and fertilisers was then driven up national and international political agendas by the 2008 food and fertiliser price spikes and subsequent increased global food prices and price volatility.

4.2 Rethinking subsidies' roles and modalities

The growing resurgence of interest in input subsidies led to and drew from new thinking about both the impacts of and the modalities for input subsidies. This, like the resurgence in policy interest discussed above, had its origins partly in concerns about the lack of apparent growth in staple food crop productivity and fertiliser use and lack of market development in many African countries. Building on the strengths and weaknesses of earlier 1960s and 1970s thinking on subsidies, as discussed earlier, this new thinking had two main streams: a reconsideration of the impacts of subsidies in the GR in Asia, and new thinking about

the modalities and roles of subsidies in poor agrarian economies. We consider these in turn.

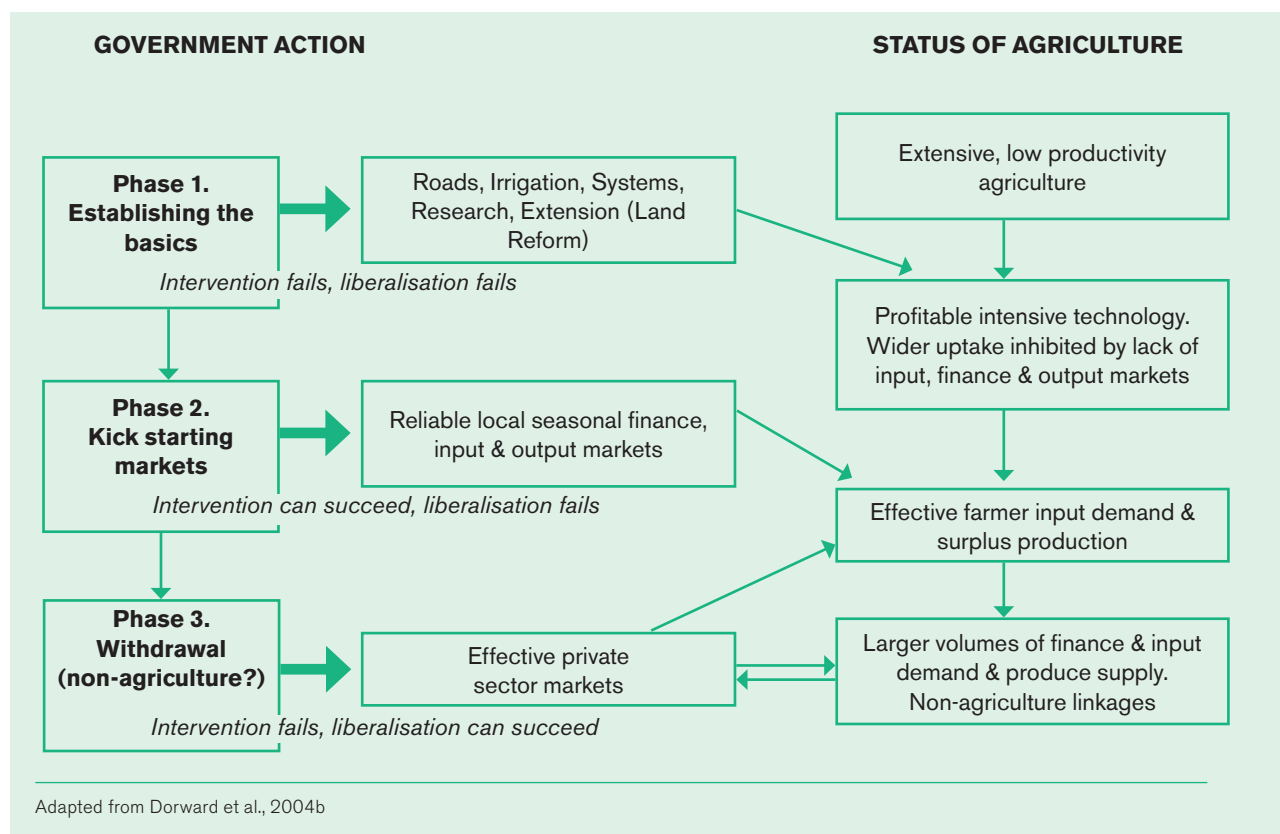
4.2.1 Asian Green Revolution lessons for Africa?

Dorward et al. (2004b) provide an example of a rethinking of the role of government intervention in general and agricultural subsidies in particular in the early stages of agricultural development. They postulated that there are necessary conditions for intensive cereal-based transformations: appropriate, high yielding agricultural technologies; local markets with stable output prices that provide reasonable returns to investment in 'improved' technologies; seasonal finance for purchased inputs; reasonably secure and equitable access to land; and infrastructure to support input, output and financial markets. They observed that these conditions (which might be more easily achieved in areas with moderate to high population density and irrigation) were necessary but not sufficient for poverty reduction and food security enhancing growth. As summarised by Djurfeldt et al. (2005), government intervention was needed to promote markets giving smallholder access to and use of available resources and technologies.

Dorward et al. (2004b) therefore proposed a schema showing the contributions of financial, input and output market interventions in different phases of development (Figure 1). Phase I involves basic investments to establish conditions for new technologies. Uptake is then likely to be limited to a small number of farmers with access to seasonal finance and markets so that achievement of a rapid agricultural transformation needs to be 'kick started' by government intervention (in Phase 2). This enables larger numbers of poorer farmers to access seasonal finance and seasonal input and output markets at low cost and low risk. Farmers then become used to the new technologies while volumes of credit and input demand and of produce supply lead to falling per unit transaction costs and growing volumes of non-farm activity (arising from growth linkages). Governments can then withdraw from market activities and let the private sector take over (Phase 3).

Dorward et al. (2004b) identified major difficulties to be overcome in managing these interventions effectively and efficiently and in resisting political pressures to expand and continue with market interventions and subsidies when they are no longer necessary (and are indeed harmful). There are particular difficulties with timing: the deadweight costs of such interventions

Figure 1 Processes and conditions for agricultural transformations



are high if they are introduced too early, or continued too long. However, since they may only yield benefits during a critical but possibly short period in the initial transformation, these benefits may easily be overlooked by analysts. There are also difficulties with government capacity to manage complex coordination tasks and to control both costs and corruption or rent seeking in large, complex and expensive programmes.

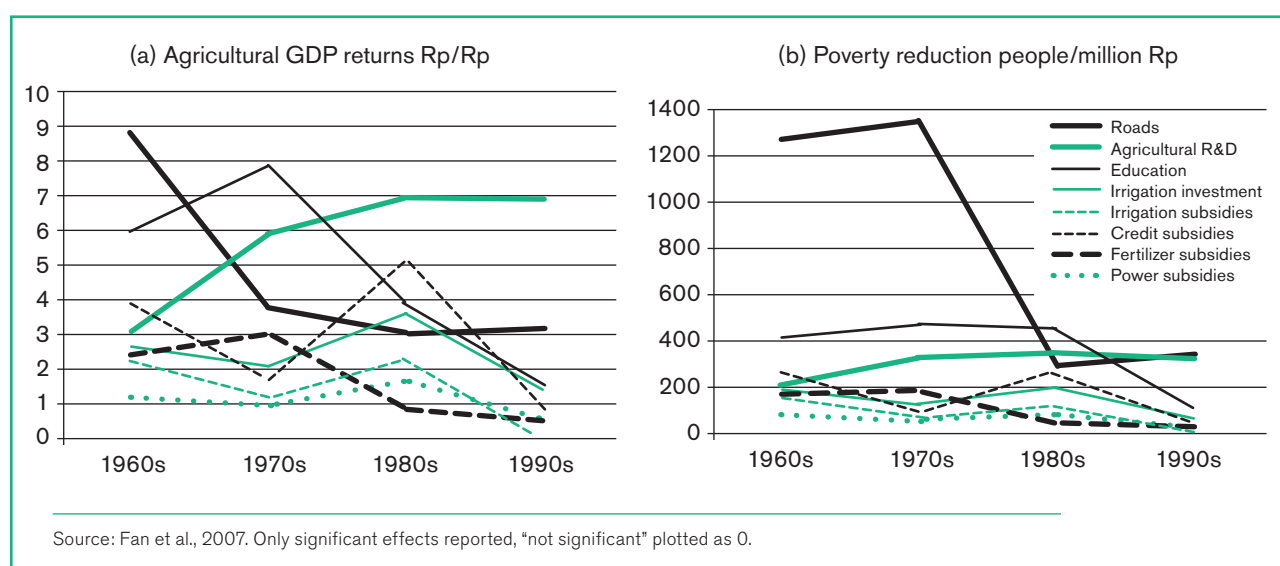
It is difficult to empirically test the hypotheses in this scheme (Figure 1), originally put forward in Dorward et al. (2002), particularly if we wish to isolate the contributions of different investments and subsidies (Hazell, 2009, p 25). However, Fan et al. (2007) estimated the returns in agricultural GDP (gross domestic product) from government expenditures across different Indian states and decades. These expenditures were divided between subsidies (separating credit, fertiliser, power and irrigation) and investments (separating education, irrigation infrastructure, roads and agricultural research and development). The results are shown in Figure 2. Dorward et al. (2004a) used these results to test hypotheses regarding negative and positive returns to different subsidies and investments. Agricultural GDP returns to spending² on investments in education, roads and agricultural research and development were generally higher than on operational subsidies, with returns to investments in agricultural research rising over time but falling for other investments. Returns to spending on operational subsidies were lower but, with the exception of subsidies on power, nevertheless initially greater than two. Returns to spending on

fertiliser subsidies then rose a little in the 1970s before declining in the later stages of the GR, while returns to spending on credit subsidies fluctuated but remained above two for the first three decades (rising to over 5 Rupees/Rupee in the 1980s). Irrigation subsidies showed a similar pattern but at a much lower level. Returns to spending on all subsidies were very low in the 1990s.

Analysis of impacts of different subsidies and investments on poverty reduction showed similar general patterns except that the poverty benefits from road investments were much higher than returns to any other investments or spending in the 1960s and 1970s (Figure 2b).

The changing pattern of returns to government investment and subsidies (Figure 2) is in many ways consistent with the phasing of intervention needs and opportunities (Figure 1). However, as we shall argue later, the specific (and relative) returns to different investments and subsidies are likely to be highly context-specific, depending not only on the general phasing as hypothesised above but also on the specific design and implementation of investments and subsidies. Application of these results to situations with different contexts and different types of investments and subsidy programmes must be done with great care. We can nevertheless conclude that analysis of the roles and impacts of developing countries' agricultural subsidies on food security and poverty reduction needs to place more emphasis on different dynamic

Figure 2 Agricultural GDP and poverty reduction returns to Indian government spending, 1960s–1990s



² It should be noted that the estimates of returns to government spending reported by Fan et al., 2007 are not the same as estimates of economic benefit cost ratios Dorward and Chirwa, forthcoming.

contexts, in particular basic conditions and phases and complementary investments and policies.

We use this to draw a general distinction between three broad policy contexts which emerge from the discussion above: 'successful Asian GRs' in the 1960s–1970s corresponding to Phase 2 (Figure 1); 'post-GR Asian situations' in the 1980s–1990s and 2000s corresponding to Phase 3; and 'current pre-GR sub-Saharan Africa situations' in the 2000s corresponding to Phase 1. The analysis also leads onto a richer and more dynamic consideration of the possible outcomes from the GR policies that included, *inter alia*, substantial use of subsidies. Dorward (2009), drawing on analysis of change in successful Asian GRs (Rosegrant and Hazell, 2000), suggested these outcomes included lower staple food prices and higher wages, 'thickening' of supply chains and rural input and output markets, improved real incomes and food security for both recipients and non-recipients (a result of food price and wage changes), and long-term economic structural changes – with higher demand for higher value farm and non-farm goods and services, accompanied by increased supply capacity of land and labour released by higher staple crop productivity.

These subsidy benefits augment those identified in the earlier (1960s and 1970s) analysis outlined above and suggest new ways of both theorising about subsidies and making them more effective and efficient. They do not, however, diminish the risks from or need for attention to the input subsidy difficulties identified earlier – notably in rent seeking and associated political diversion, rationing, spiralling costs, inefficient management and market distortions.

This analysis is not uncontested. Jayne and Rashid (2013), for example, cite Economist Intelligence Unit (2008) and the findings of Fan *et al.* (2007) when arguing that input subsidies tend to divert government spending from more productive investments in agriculture. The validity and relevance of the Economist Intelligence Unit (2008) findings are, however, difficult to interpret without methodological information on how these empirical conclusions are reached. It is also difficult to know how far to apply Fan *et al.*'s findings to different situations in Africa. It seems clear, however, first that attention should focus on results from the early and not later years of the Indian experience, and second that complementarities with irrigation and roads investment in India and the dependence on rainfed farming and poor road systems in much of Africa are a major issue. Here the high poverty reduction returns to credit subsidies in the work of Fan *et al.* and their replacement by very high subsidy rates in many African input subsidy programmes (discussed later) needs to be taken into account. We are not aware of

any empirical research on this, but hypothesise that accumulated knowledge from past but not yet adopted research in Africa may also reduce returns of current investment (or the volume of investment needed before marginal returns decline) below those experienced in India (although this is not to deny the need for and high marginal returns from continuing research in the face of changing and heterogeneous opportunities and conditions in Africa)³. Similarly the returns to input subsidies are likely to be highly sensitive to unsubsidised input price levels – which depend upon global prices, importation costs and other government policies affecting fertiliser prices, for example, exchange rates. Context is therefore critical and simple application of benefit cost ratios from Asia to Africa are facile and likely to be misleading, like simple comparisons of average fertiliser application rates (Jayne and Rashid, 2013). Finally, as Jayne and Rashid (2013) point out, input subsidies are attractive in holding out the promise of much faster returns than most other investments.

The debate here therefore appears to be only partly about the record of agricultural input subsidies' roles in Asia: it is more about how far that record is relevant and how it can be applied to understanding the very different circumstances 40 years later in Africa.

4.2.2 New thinking about input subsidy modalities and roles

New thinking about input subsidy modalities and roles has proceeded in the 2000s and 2010s to a large extent independently of any reconsideration of the role of input subsidies in the Asian GR and more in response to the combination of concerns about low fertiliser use in Africa and lack of market development as discussed in section 4.1. These concerns led to consideration of potential new roles for input subsidies specifically in promoting short-term private input market development, soil fertility replenishment, social protection for poor subsidy recipients and national and household food security (Morris *et al.*, 2007).

Identification of these potential new roles was accompanied by interest in new approaches and instruments for delivering input subsidies, so-called 'smart subsidies'. These emphasised the development of sustainable input supply systems, as shown by ten features of smart subsidies (Morris *et al.*, 2007): promoting fertiliser as part of a wider strategy of market-based solutions and competition in input supply; paying attention to demand and economic efficiency; empowering farmers; pursuing regional integration, sustainability, pro-poor economic growth and an exit strategy; giving precedence for poverty reduction or food security over efficiency and sustainability goals only in exceptional circumstances (*op.cit.*, p 103–105).

³We postulate very different patterns of returns from systems where continuing research uptake feeds demands for and returns from continuing research.

The key insight of this approach is that input supply constraints are critical to farmers' access to and use of inputs, and that input subsidy costs will be lower and their benefits greater if they are implemented as means rather than ends in the context of wider goals of food security and fertiliser system development (Druilhe and Barreiro-Hurlé, 2012).

Smart subsidy instruments include vouchers, targeting, rationing, loan guarantees, demonstration packs and matching grants. The rationale for 'smart subsidies' and the instruments they promote have increasingly provided the dominant conceptualisation of subsidy roles and implementation in Africa. As we shall see in subsequent sections, however, actual implementation of smart subsidies and achievement of their market development ambitions have been limited.

Although the 'smart subsidies' concept is valuable and important, Dorward (2009) and Chirwa and Dorward (2013) argue that this conceptualisation of the roles of subsidies also has its limits. Insights from the rethinking of the Asian GR, discussed above, and analysis of financial, input and output market failures in poor agrarian economies (Dorward and Kydd, 2004; Dorward et al., 2005) suggest that a more holistic view of the potential contributions of input subsidies should include a wider consideration of their roles in:

- Addressing the affordability or seasonal finance constraints of input use (as well as, or rather than, profitability and farmer knowledge constraints);
- Promoting the dynamic effects of subsidies on growth (through increasing the productivity of large amounts of land and labour and through changes in food prices and/or wages) as well as soil fertility replenishment and input supply system development; and
- Providing some social protection not just directly to subsidy recipients, as suggested by Morris et al. (2007), but also indirectly through lower food prices and/or higher wages and through economic growth that increases capacity for informal social protection mechanisms).

Consideration of these wider roles should then be accompanied by greater attention to consumer benefits and growth in rural livelihoods and rural economies (alongside attention to the new design and implementation features that are central to the implementation of 'smart subsidies' and to subsidy effects on producer livelihoods and input supply systems).

Although consideration of these potential benefits might appear to suggest that agricultural input subsidies can be a 'magic bullet' for agricultural, rural and wider growth and development, this is not at all the case. First, subsidy programmes must be implemented efficiently with minimal diversion and leakages of subsidies and administration costs, appropriate subsidy and farmer contributions, and with timely and effective rationing, targeting and input delivery.

Second, stringent conditions must be met even for efficiently implemented programmes to generate beneficial impacts: rural livelihoods must be constrained in their ability to access affordable inputs whose wider use will have substantial productivity impacts. The extent and nature of and constraints on rural livelihoods and the productivity and sustainability of the core technologies being promoted are fundamental in all of this. Critical attention must also be paid to the profitability, sustainability and efficiency of input supply and supporting systems being developed and to wider conditions affecting programme effectiveness: national and local political economies and formal and informal institutions affecting incentives and penalties in leakages and secondary markets.

Greater understanding of these issues should enable and guide dynamic and complementary integration of investments and policies. Such integration would link and allocate resources to input subsidies, other private sector supply system development initiatives, roads, agricultural research, agricultural extension, irrigation, complementary agricultural technologies (eg involving greater use of organic fertilisers), and diversification into non-staple higher value agricultural markets (eg vegetables and livestock production) and into the non-farm economy.

4.3 Input subsidy implementation in Africa

Evidence on the recent implementation of agricultural input subsidies across Africa is probably best described as 'patchy'. To our knowledge there has been no attempt to document all subsidy programmes in Africa, but a growing number of studies review or provide information available on large-scale subsidy programmes on which some information is available (Dorward, 2009; Baltzer and Hansen, 2011; Druilhe and Barreiro-Hurlé, 2012; Chirwa and Dorward, 2013; Jayne and Rashid, 2013; Wanzala-Mlobela et al., 2013). Together these identify a total of 11 countries operating such subsidies (although Ethiopia does not consider its policy of selling fertiliser below cost as a subsidy programme) and a 12th, Burundi, has more recently initiated such a programme. Of these 12 large-scale subsidies, one (Nigeria) was started in 1992, another (Zambia) in 2002, but favourable publicity on the Malawi programme (started in 2005) stimulated wider uptake – with Kenya and Rwanda starting programmes in 2007, and Tanzania, Senegal, Mali, Ghana and Burkina Faso following in 2008. Burundi then introduced its programme in 2012. Mozambique piloted a subsidy programme in 2009/10 and 2010/11 (Carter et al., 2013). Estimates of total agricultural input subsidy programme costs in Africa are not available, but Jayne and Rashid (2013) estimate the cost in 10 countries (the countries listed above excluding Rwanda, Burundi and Mozambique) at just under US\$1 billion in 2011, a little over 28% of total public expenditure on agriculture across these countries.

The nature of these programmes varies and they also evolve. Some offer a universal price subsidy while others ration supplies to targeted farmers and crops (normally food crops), often using vouchers. Some rely on and seek to develop the private sector for fertiliser and seed supply, while others rely on parastatals. The Nigerian programme recently had a major overhaul and redesign to make it more targeted and more supportive of input supply system development, and to reduce extensive corruption (Liverpool-Tasie and Takeshima, 2013).

Chirwa and Dorward (2013) observed a number of similarities but also divergences across the programmes that they reviewed. With regard to programme objectives, there was a common emphasis on improving household or national food security, input (seeds and fertiliser) adoption and producer welfare. Improving input access and input supply systems were common but not universal objectives, while only three programmes explicitly recognised the potential for

producer subsidies to benefit poor consumers (apart from subsistence producers). Only the Tanzanian programme was explicitly intended to promote input use efficiency and soil fertility replenishment.

Chirwa and Dorward (2013) examined programme design and implementation. They observed general use of private sector importers of fertiliser, an almost universal focus on inputs for staple food production, very high subsidy rates (50% or more for most programmes), very little consideration of 'exits' (none of 'sustainable graduation') and almost all rationed (or attempted to ration) the quantity of subsidised inputs received per household, with vouchers a common (but not universal) means of achieving this. They also noted that late of delivery of inputs was common, information and evaluations were patchy (with more information on implementation and less on impacts and limited interest in programme efficiency), and (if examined) there was significant displacement or crowding out and significant 'leakages' or diversion of inputs from the intended beneficiaries – associated with poor targeting⁴ and the first and third types of 'rents' discussed earlier in section 3.

Many of these observations are found in other reviews: problems of leakage, crowding out and targeting difficulties (Druilhe and Barreiro-Hurlé, 2012; Jayne and Rashid, 2013; Wanzala-Mlobela et al., 2013); of late delivery and lack of monitoring and evaluation information (Druilhe and Barreiro-Hurlé, 2012; Wanzala-Mlobela et al., 2013). Wanzala-Mlobela et al. (2013) also noted problems with late payments of fertiliser suppliers⁵, limited extension (and credit) support to farmers, exclusion of agro-dealers [also noted by Jayne and Rashid (2013)] and poor and often late tendering procedures.

It appears therefore that despite the rhetoric of smart subsidies, the extent to which subsidy programmes have actually pursued smart subsidy objectives has been limited and some features that have been pursued have proved difficult to apply in practice (for example targeting). Wanzala-Mlobela et al. (2013) only classified two of the eight programmes they reviewed as 'more market friendly' (with subsidy programmes encouraging private sector development in both importation and accessible distribution). This is despite more common use of instruments associated with smart subsidies, with all eight programmes considered to have expanded access and quantities of fertiliser use by targeted farmers (with targeting defined very broadly as smallholder rather than large-scale farmers) – five of them used rationing and three used vouchers.

⁴ Chirwa and Dorward, 2013 suggest that in Malawi targeting errors might be reduced and accountability increased by a universal but smaller rationed subsidy package.

⁵ Malawi faced particular problems here in 2013/14, with crippling cash flow problems facing suppliers and interest charges facing government.

4.4 Input subsidy impacts in Africa

Information on programme outcomes and impacts of recent subsidy programmes in Africa is more limited than on programme implementation due to sparse and often poor quality information – indeed Wanzala-Mlobela et al. (2013) restricted their review to consideration of design attributes, implementation modalities and implementation performance and due to lack of information did not consider programme impacts. These difficulties arise from a lack of emphasis on evaluation in many programmes, the range of different possible impacts, and analytical and data difficulties associated with estimating many of these impacts. Data

difficulties arise from challenges in measuring critical variables in heterogeneous and dispersed poor rural areas, while there are numerous analytical challenges in attempting to determine the causal pathways by which subsidy programmes may or may not have led to observed changes in variables. Figure 3 illustrates the scope and scale of the challenges in determining impacts of a large-scale subsidy programme.

It is important to be aware of the complexities of the relationships and hence determination of causal relations between subsidy programme implementation and impacts, but this can be overwhelming. Figure 4 therefore presents a more tractable, but still very demanding, linear representation of the programme impact pathway and relates this to data sources and analysis needed for impact analysis and evaluation.

Figure 3 Simplified conceptual framework of subsidy programme impacts and their determinants

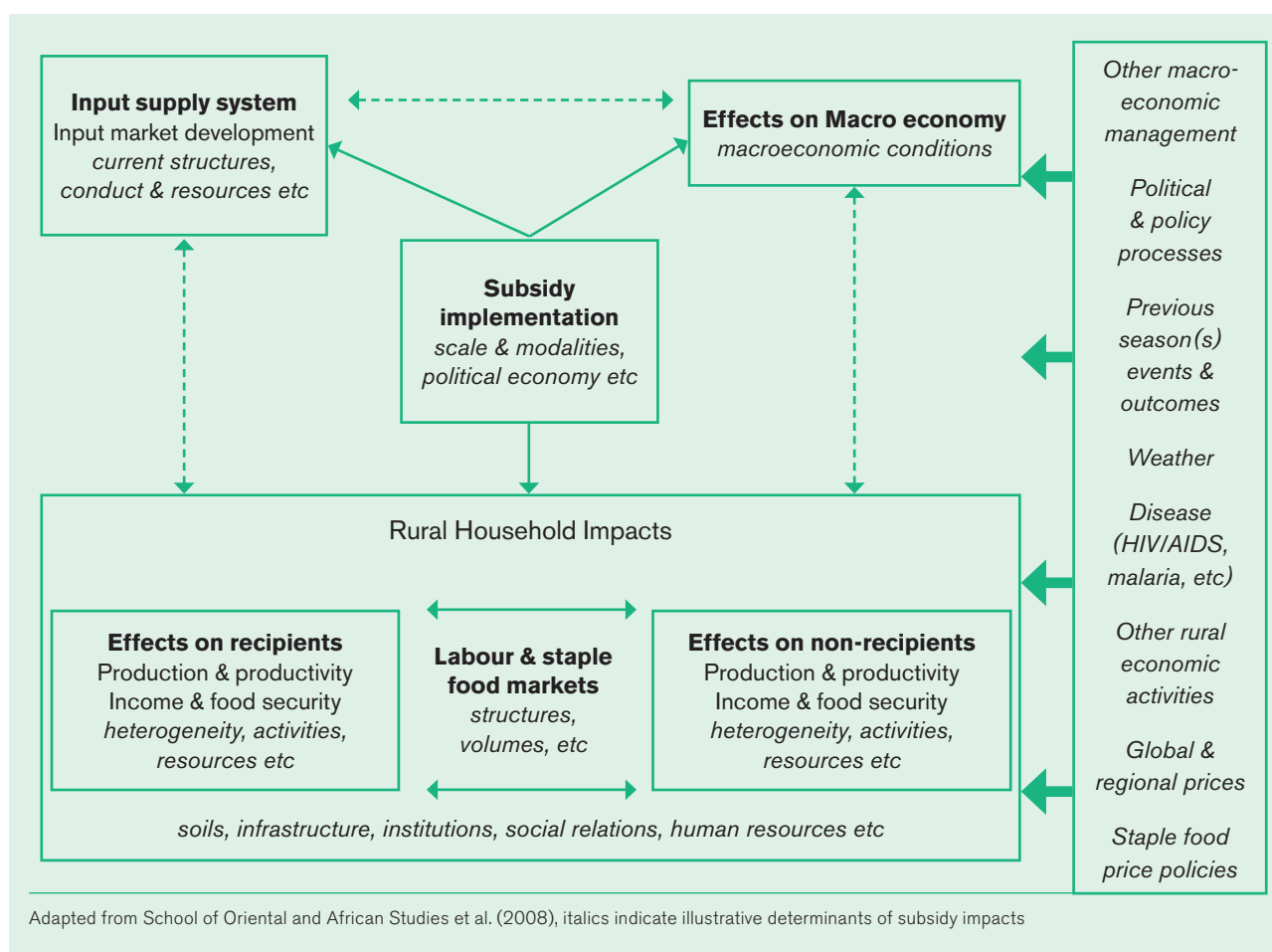
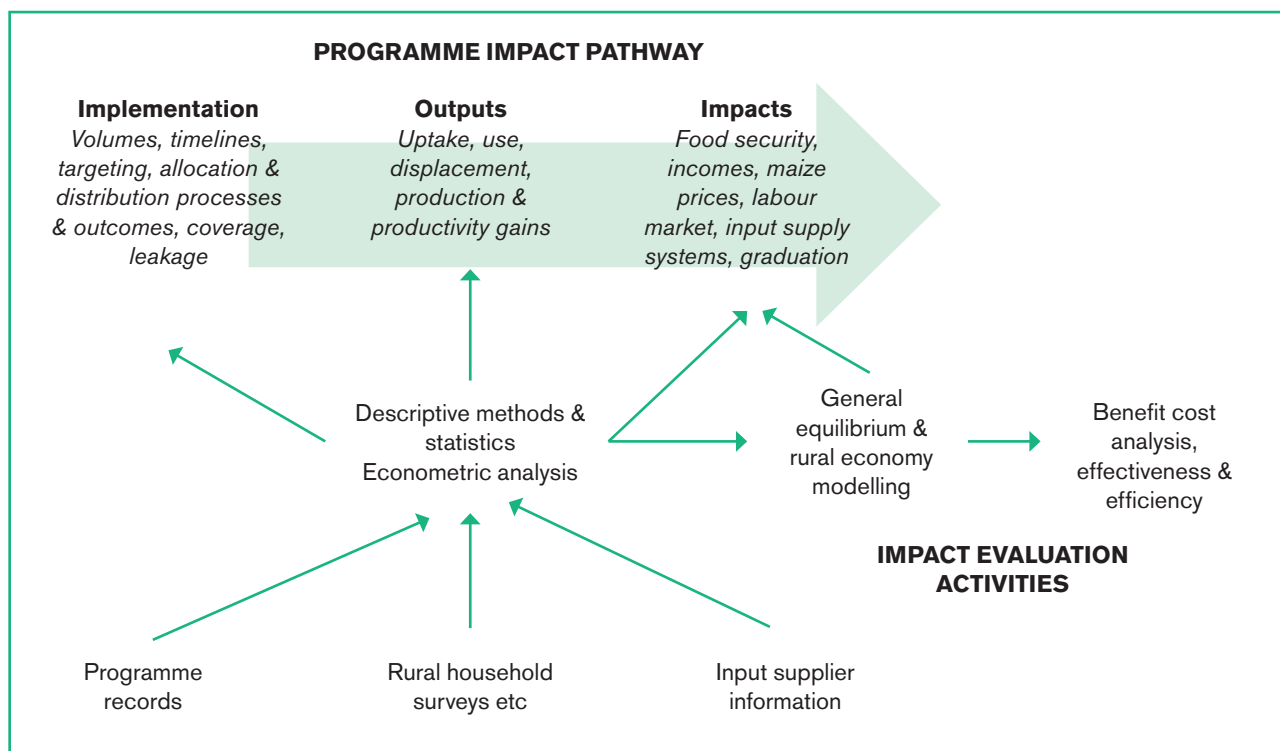


Figure 4 Data and analytical requirements for comprehensive impact evaluation



Basic key variables on programme implementation such as total quantities of inputs disbursed are generally available from programme records. Information on actual input receipts, targeting, coverage and leakage are more challenging, and require representative rural household surveys. Such surveys are essential for determining programme outputs (such as input receipt and use, displacement or crowding out and in, and incremental production), although it is important that close attention is given to problems of data quality and bias (particularly on yields and population estimates) and to calculation and attribution of programme (treatment) effects with cross-sectional surveys. Estimations of programme impacts (Figure 4) and of programmes' benefit cost ratios are even more problematic as they require consideration of general or at least partial equilibrium modelling, which are much more demanding of both data and analytical capabilities.

In this context it is salutary how little reliable information there is on the impacts of recent input subsidy programmes in Africa. As noted above, Wanzala-Mlobela et al. (2013) did not look at programme outputs or impacts due to lack of data. Druilhe and Barreiro-Hurlé (2012) rely largely on FAOSTAT (<http://faostat.fao.org/>) for selected countries to conduct before-and-after/with-and-without analysis of aggregated yield trends. Well aware of the shortcomings of the quality of such data – for example the scale of the yield increases following the introduction of the Malawi programme are widely questioned (Chirwa and Dorward, 2013)

– they conclude that “Available evidence, albeit very limited, suggests that such programmes have been effective in raising fertilizer use, average yields and agricultural production.”

Household survey data do exist and have been widely analysed for the Malawi and Zambia programmes prior to 2010 – eg Jayne et al. (2013) and Lunduka et al. (2013) – allowing estimation of displacement (or crowding out) and hence of incremental input use and incremental production. However, for Malawi at least, data quality issues in regard to yield estimates lead to widely differing estimates of incremental production (Jayne et al., 2013; Dorward and Chirwa, forthcoming). Survey estimates of input receipt, and targeting are also available for Nigeria (Liverpool-Tasie and Takeshima, 2013) and Tanzania (Patel, 2011; Pan and Christiaensen, 2012) and for production in Tanzania (Patel, 2011) and crowding-in for Nigeria (Liverpool-Tasie and Takeshima, 2013). Survey-based estimates of food security, nutrition, wage, food price and poverty impacts and of supplier impacts are really only available for Malawi, and are of mixed quality (Beck et al., 2013; Chirwa and Dorward, 2013).

Malawi is again the only country for which there are estimates of growth linkage and partial and general equilibrium impacts of a subsidy programme (Buffie and Atolia, 2009; Filipinski and Taylor, 2012; Arndt et al., 2013; Chirwa and Dorward, 2013; Dorward and Chirwa, 2013; Dorward et al., 2013). While these

are subject to substantial data and methodological limitations, they do suggest that these impacts are likely to increase overall programme benefits above simple direct production and beneficiary impacts.

Benefit cost analysis should take account of all possible impacts (positive and negative) of a programme on the wider economy and on particular stakeholders, and it is important that different methods and estimates used for both input subsidy and alternative investments are indeed comparable (Chirwa and Dorward, 2013). To our knowledge, estimates of benefit cost ratios have only been published for programmes in Zambia, Kenya and Malawi (Chirwa and Dorward, 2013; Dorward et al., 2013; Jayne et al., 2013). However, Dorward and Chirwa (forthcoming) raise substantial methodological concerns about the Zambian, Kenyan and Malawian estimates in Jayne et al. (2013), also noting the lack of allowance for any wider growth and general equilibrium effects (which the Malawi analyses cited above suggest can be substantial). Taking these issues into account it is likely that benefit cost ratios in the three countries have at least been equal to or better than one, despite quite major implementation weaknesses. This suggests that there is potential for very favourable returns from input subsidies if the recommendations of relevant reviews (Druilhe and Barreiro-Hurlé, 2012; Chirwa and Dorward, 2013; Jayne and Rashid, 2013) are followed, which we summarise broadly as:

- Restriction to beneficiaries and livelihood systems with constrained access to affordable inputs with potential for high productivity impacts
- Improved targeting and rationing systems,
- Improved systems for lower cost and timely input acquisition and distribution
- Subsidy rates that are fiscally affordable and minimise displacement of unsubsidised input purchases while making incremental purchases affordable to target beneficiaries
- Development of competitive input supply systems
- Better systems to control fraud
- Transport infrastructure, agricultural research and extension investments to lower input costs, promote and raise the sustainable productivity of inputs on farmers' fields and improve input and output market access.
- Integration of these programmes into wider and consistent, long term national economic growth and development policies including necessarily long term consideration of ways of promoting sustainable graduation and reduction in programme scale and costs
- Better integration with social protection programmes

It is important to reiterate and broaden a point made earlier – that context is critical and estimates of benefit cost ratios should not be generalised across countries within Africa, just as estimates should not be generalised from Asia to Africa. Variations in implementation capacities, in livelihood constraints and opportunities, in agro-ecological conditions affecting input productivity and in complementary investments mean that there are likely to be large variations in both potential and actual returns to subsidies across different countries and situations in Africa.

5

Conclusions

This review traces the changing fortunes of agricultural input subsidies, from heroes to villains (Dorward and Morrison, in press) and their (contested) rehabilitation. There are differences in opinion and questions about the overall desirability of input subsidies as first best policy tools for stimulating pro-poor agricultural growth in different countries in Africa. However, there is general agreement that the political features of large-scale programmes (their high visibility, popularity with rural populations, potentially rapid results, and opportunities for political and other patronage) mean that they are now a major and likely a continuing feature of agricultural development policy in many countries in Africa (Druilhe and Barreiro-Hurlé, 2012; Jayne and Rashid, 2013). If this is the case then it is essential that every effort is made to improve their effectiveness and efficiency – through better context-specific design and implementation, and through appropriate complementary policies and investments to lower input costs, promote development of competitive input supply systems and raise the sustainable productivity of inputs on farmers' fields. With such efforts, agricultural input subsidy programmes can in the right context yield substantial developmental benefits. Without such efforts, however, there are major risks of high costs and limited benefits and poor returns to very large investments.

Three further issues need to be raised:

First, it is remarkable how little climate change and rapid population growth have featured in debates about the impacts of input subsidies. However, Arndt et al. (2013) argue that in Malawi the promotion of hybrid seed varieties through the programme has important potential benefits in increasing production resilience in the face of increasing rainfall variability. Similarly, Dorward et al. (2013) argue that rapid population growth has paradoxically both obscured and increased the importance of incremental production from Malawi's subsidy programme. The food deficits common before the introduction of the current programme, absent in its early years but now recurring, are raising political questions about the programme's continuing effectiveness, without recognising the effects of a 25% or more increase in population since the programme's inception. Both climate change and population growth, however, require rapid economic growth – first to provide resources for increasing resilience to climate change and variability and second to provide a stimulus, along with female empowerment and family planning services, to reducing fertility and population growth. The potential for rapid returns to well designed and implemented input subsidies should be a major issue here.

Second, there are valid concerns that subsidy programmes frequently appear to increase dependence on inorganic fertilisers and the cultivation of an already dominant crop like maize – should subsidies not promote more organic fertiliser use, holistic soil fertility management and diversification away from cereal mono-crops? It is widely recognised that they should, but in order to provide poor smallholder farmers with the opportunity to diversify out of low-productivity staple crop production farmers must first be enabled to reliably improve the productivity of their basic food crop and their production of organic matter. There is some evidence that Malawi's subsidy programme has promoted some diversification out of maize Dorward et al. (2013), but 'sustainable graduation' from such programmes (rather than simplistic exits) is an issue that needs much more attention in programme design and implementation (Chirwa and Dorward, 2013).

Finally, there are considerable and justifiable concerns among many analysts that the political economy processes that sustain agricultural subsidies mean that once put in place they are very difficult to remove – as shown by the European Union and the US as well as post-GR countries in Asia. We argue, however, that it is better to be less poor in a less poor society with liabilities from a history of once successful subsidies than poor in a poor society without such liabilities. This does not deny the importance of seeking to control subsidy costs, and the very high costs they can impose if not controlled (as for example with some subsidies in India). It does, however, reiterate the importance of making sure that (as outlined earlier) input subsidy programmes are implemented as well as possible and only in situations and with complementary policies where they will indeed play a significant part in helping poor people and societies become less poor.

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In recent years large-scale agricultural input subsidies have had a contested 'rehabilitation' in sub-Saharan Africa. This paper reviews the changing paradigms, politics and theories associated with input subsidies' decline and rise, and the implementation and impacts of recent large-scale programmes. Empirical evidence is patchy, and their impacts contested and dependent on context, design and implementation. Few programmes have lived up to expectations or achieved acceptable benefit cost ratio estimates . The paper discusses how such programmes can improve and realise their full potential, to deliver major dynamic benefits to smallholder farmers and the wider economies of which they are a part.

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