Future Agricultures

Research Paper

Improving Access to Input & Output Markets[1]

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Executive Summary

Agriculture can play two potential roles in wider economic growth, driving growth (providing fundamental increases in productivity and earnings) and/or supporting growth processes in terms of multiplying and spreading the benefits of primary growth drivers through an economy. Growth drivers include exports of tradables and increased production of foods (both tradables and non-tradables). Non-tradable staple foods have particular importance in poor rural economies as they are important to the real incomes of large numbers of poor net food consumers and small scale net producers, and they tend to have high positive growth linkages and low leakages. Increased production of non-staple horticultural and livestock products for domestic consumption are important as growth supports where these are semi-tradeables or non-tradeables, but are only effective in the context of an economy benefiting from other growth drivers.

Consideration of the contributions of different types of agricultural production in the context of wider national growth processes allows the contributions of different types of smallholder agricultural development to be placed in the context of different types of economy. Three broad types of economy are identified – countries with minerals, coastal countries without minerals, and land locked countries without minerals. Challenges and opportunities facing the development of smallholder production of different agricultural products are also identified.

While high global food prices offer potential benefits to net food producers, these are undermined by the negative effects of high food prices on large numbers of poor food consumers (including large number of food deficit farmers), and hence on the wider economy, and by problems financing fertiliser purchases, following very large increases in fertiliser prices. Long term effects of the 2008 price hike and future price movements are uncertain, but they have focussed national and international attention on food markets and supply chains, and on problems of food price instability and of smallholder access to seasonal inputs and financial services in food production.

Public good investments and solutions to coordination problems are critical challenges constraining market access in intensification of higher potential cereal staple foods, which are themselves critical for driving and/or supporting wider pro-poor growth in many countries. Public - private partnerships must play a major role in addressing these challenges, and this defines the major policy initiatives needed in improving market access in smallholder agriculture.

Other challenges and opportunities, and the benefits of development in input and output markets, must not be overlooked, though here the state should generally play a more facilitative background role that enables private sector investment.

1. Introduction

This paper considers existing and emerging challenges, opportunities and policy responses in input and output market access in Southern Africa.

The paper begins by briefly reviewing the importance and roles of both staple food crops and agricultural cash products in economic growth and poverty reduction. We then develop a typology of agricultural products and their potential roles in development in different types of countries. This provides a basis for consideration of the major challenges and opportunities facing the development of different types of product, and the importance and challenges of access to input and output markets for these product types.

A core message from this is the need in particular staple crops for some coordination role to be played by the state in input and output market services. This provides background for examination of particular challenges and opportunities in increasing input use, in credit provision, and in food price stabilisation and, with these challenges, investment and other policy roles for the state.

2. Agriculture's different roles in growth and poverty reduction

The importance of agricultural development and in particular of increases in staple food crop productivity as a foundation for broad based economic growth is stressed by well established theories of development with strong empirical evidence. Recent increases in global food prices have brought this home to policy makers in both the international community and national governments.

Agriculture can play two potential roles in wider economic growth, driving growth (providing fundamental increases in productivity and earnings) and/or supporting growth processes in terms of multiplying and spreading the benefits of primary growth drivers through an economy (Poulton and Dorward 2003). This is illustrated in figure 1, which shows how agriculture can work as a growth driver in two ways. First, growth in production of tradables (imported or exported commodities) raises incomes of domestic producers who can produce either below import parity price for domestically consumed products or below export parity price for exports. In either case, production and producer incomes can expand without affecting prices (as these are determined in world markets). Another way in which agriculture can drive growth is through increased production of non-tradable or semitradable products which are important in people's expenditure (with high average budget shares). Here growth occurs through increases in consumer incomes as a result of reduced prices and hence reduced expenditure, releasing funds for other expenditures.

Agriculture has an important role as a growth supporter because if people's incomes are rising (as a result of agricultural or non-agricultural growth drivers) this will lead to increased expenditure on horticultural and livestock produce (as demand for these products trends to rise with increasing income). If local agricultural producers are able to respond to this increased demand then this multiplies and spreads the benefits of the original growth stimulus. If local agricultural producers are not able to respond to this increased demand then the extra demand will lead to imports (leaking out of and being lost from the economy) and/ or inflation (reducing the increases in real income from growth drivers).

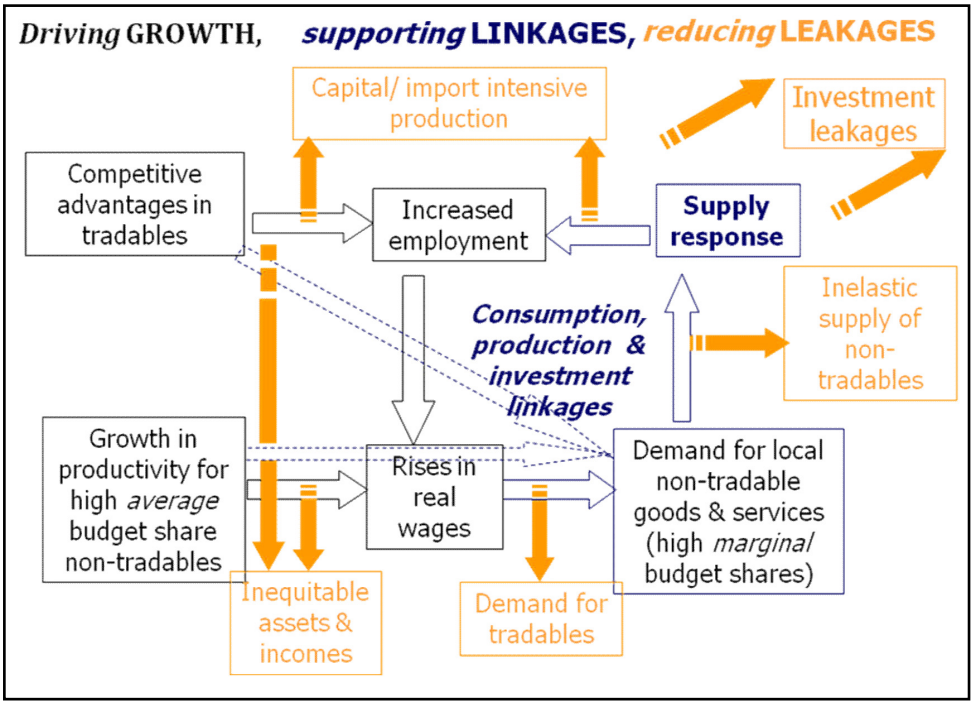
Increases in staple food productivity can drive growth as a tradable in countries where staple food consumption is well integrated with world markets. Such countries tend to be coastal and to rely on cereals (wheat, maize or rice) as major staple foods. Where staple food consumption is less well integrated with world markets (as is the case with cereal crops in land locked countries and with root crops even in coastal countries) then increases in staple food productivity can drive growth as a nontradeable. Even as a tradeable in a coastal country, a shift from importing to self sufficiency or exporting of cereals may lead to some domestic price reductions, through differences between import and export parity prices due to shipping and port costs. Increases in staple food productivity also have two potential roles as growth supporters, first in releasing resources for other productive resources where there is rising demand for non-staple and non-farm goods and services, and

second in providing feedstock to meet rising domestic demand for livestock products. In both these cases increases in staple food productivity reduce leakages through increased domestic linkages where staples are tradeables and through increased elasticity of supply where staples are nontradeables. The importance of all these roles of increased food staple productivity has been brought home by the recent high global food and fertiliser prices – which will be discussed in more detail later.

These potential roles of increases in staple food crop productivity in driving and supporting growth are potentially particularly important and effective in poor rural economies because of the large absolute and proportionate scale of resources poor people and poor economies devote to food production and consumption and the large numbers of (particularly poor) people and large amounts of land and capital involved in their production. 'Deficit food producers' (farmers who produce less food than they consume and are therefore both producers and buyers of food crops) are generally considered to constitute 50% or more of farmers in much of Africa and to be poorer than surplus food producers (see for example Barrett, 2008 . Such people can get a double benefit from staple food crop productivity increases, as both producers and consumers. Growth linkages from income gains from poor people also tend to be high due to consumption patterns with a

Figure 1. Drivers, supporters and leakages in a local economy

Source: Dorward et al. 2003)



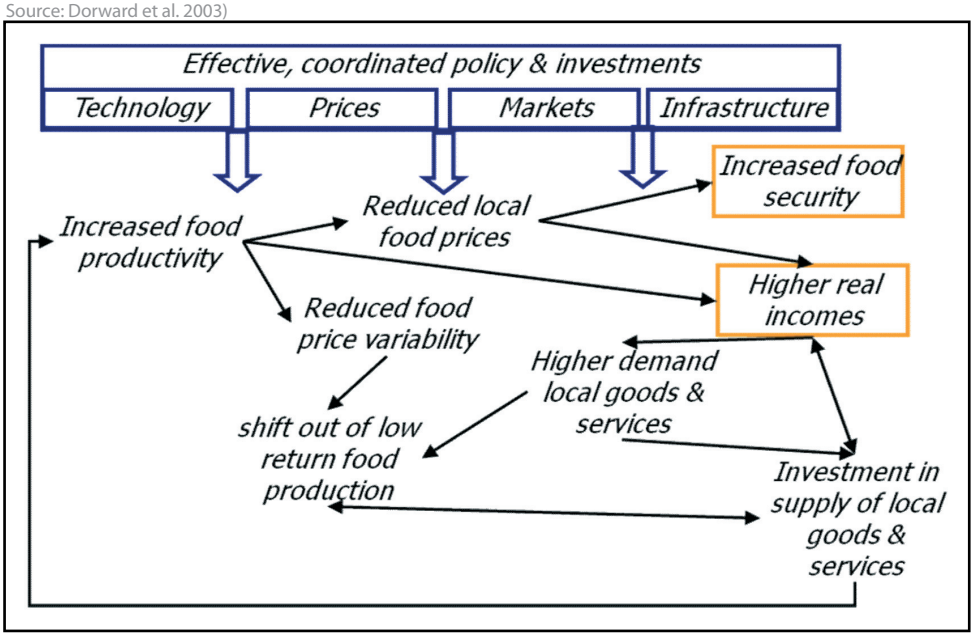
high non-tradeable content (Hazell and Hojjati 1995; Delgado et al. 1998). Finally, there are further benefits where increases in staple food crop productivity lead to low and stable food prices as well as increased real incomes for large numbers of producers and/or consumers. This can (a) stimulate demand for non-staple and non-farm products (as a result of higher real incomes), (b) provide resources for investment in supply to meet this demand (also as a result of higher real incomes) and (c) allow people to shift out of low return food production (which they may be locked into as a result of the need for subsistence production in the context of high and variable food prices) and into higher return non-staple and non-farm activities. These benefits from staple food crop productivity increases are illustrated in figure 2.

We also note that increases in staple food crop productivity can have environmental benefits if these reduce pressures for cultivation on marginal or forested lands, and/or involve improved soil management (with reduced run-off, and soil erosion).

Increases in non-staple food crop and animal productivity can contribute to growth, food security and poverty reduction in a number of ways. Where these are tradeables they can drive growth through exports (increasing returns to land and labour, and stimulating growth in employment and wages). Where these are tradeables and have high marginal budget shares (as is often the case for horticultural and animal products) they can support growth as import substitutes. Increases in nontradeable non-staple products can support growth again where they have high marginal budget shares.

Figure 2. Potential impacts of increased staple food crop productivity

Source: Dorward et al. 2003)



Tradeable growth drivers and tradable and non-tradable growth supporters can also have positive upstream and downstream multiplier effects.

This analysis of staple and non-staple agricultural products and their different potential roles in driving and supporting growth is important as it can provide insights into the extent to which these different growth drivers and supporters contribute to poverty reduction. This depends upon the factor endowments of the poor as compared with those required for producing these different products, their access and terms of access to output markets and to factor markets needed for production, the importance of different products in their expenditures, the nature of the linkages and linkages that flow from different growth drivers and supporters, and poor people's ability to participate in new service provision and employment opportunities. In general terms increasing staple food productivity has very high potential payoffs to the poor as they can benefit as both producers (most of the rural poor if they are able to increase their productivity) and consumers (both urban and rural poor if food prices fall in real terms). The nature of the benefits to the poor from increasing productivity of nonstaple agricultural products varies considerably with (a) the opportunities of the poor to increase their land and labour incomes in production (directly and indirectly), (b) with upstream and downstream employment and other multipliers, (c) with the consumption multipliers associated with expenditure patterns of different producers, (d) with nutritional benefits where lower prices of horticultural and livestock products may improve diets, and (e) where non-staple production systems contribute to improved access to, for example, input and financial services[2].

Input and output market access are critical to agricultural development and its poverty reducing impacts as these markets are critical in both facilitating productivity growth and in determining the direct and indirect ways that the poor can benefit from productivity growth.

3. A typology of agricultural intensification roles, opportunities and challenges

Having identified in the previous section different ways in which increasing agricultural productivitycan be important for poverty reduction, food security and growth in poor rural economies, we now move on to consider in this section a typology of agricultural products and their potential roles in development in different countries.

Drawing on insights from Byerlee et al. 2006, Hazell et al. 2007, and Poulton and Dorward (2008), table 1 presents a typology that sets out first the major roles for increased agricultural productivity for different types of products in countries with different characteristics, and then the major challenges that need to be addressed to achieve increased productivity. The table distinguishes first between three different types of staple food crop (and implicitly between different agro-ecological zones associated with these crops). Maize, rice (notably NERICA) and possibly wheat (though this is not a crop of much importance for smallholders in most of southern Africa) are cereals with potential high responses to significant investments in inorganic (and organic) fertiliser application. Millet and sorghum have generally lower yield potential, but there are still possibilities for significant yield responses in the context of integrated soil fertility management (ISFM) practices involving, for example, better water control, use of organic matter and micro-dosing with critical nutrients[3]. Root crops, particularly cassava, have the potential for significant yield increases with

intensification but although with time this will require substantial increases in fertiliser inputs, there are generally initial opportunities for major yield increases from improved varieties.

The high potential yields achievable with the 'high response cereals' and 'roots and tubers' suggests that these have the potential to make a major contribution to driving and supporting pro-poor growth in countries where these crops can be produced, depending on other potential drivers of growth in these countries. Following Collier 2007 and Hazell et.al. 2007, a distinction is made between countries with and without significant minerals and for countries without minerals between coastal and land locked countries. Where a country has significant earnings from minerals then these may be expected to drive growth, assuming careful management of mineral earnings and of the macro economy. Under these circumstances, increased productivity of high response cereals and roots and tubers should have a major role in supporting such growth (increasing linkages and reducing leakages) and in spreading the benefits of mineral earnings within the population. In coastal countries without minerals there may be potential for the development of export manufacturing industries, and if high response cereals and roots and tubers can be grown then increasing their productivity (and cash crop production) should be a driver of growth alongside these industries, as well as supporting growth. Where landlocked countries have no significant minerals then increasing productivity of high response cereals and/or of roots and tubers are likely to be, with cash crops, the major growth drivers. However, as Collier (2007) observes, none of the options for countries in this category are likely to deliver high aggregate growth rates for the foreseeable future.

The lower but still improved yields achievable with 'low response cereals' in more challenging agroecological conditions suggest that these will not be able to drive growth but they should have important roles in supporting growth and in providing a low cost subsistence safety net. Again the role will vary between countries with opportunities for minerals, manufacturing industries and cash crops to drive growth (although the more challenging agro-ecologies where these crops are grown are also likely to limit cash crop and livestock development options). However investment in increased staple productivity may be a least cost way of providing safety nets in a way that encourages economic activity rather than dependency.

A similar analysis can be made for three major kinds of non staple crop and livestock products. In line with our earlier discussion, we distinguish between domestically consumed non-tradables, domestically consumed semi-tradables, and traditional or non-traditional exports (tradables). The table only considers these for agro-ecosystems which have the potential for cultivation of particular crops or rearing of particular livestock (generally with potential for increasing production intensity). Domestically consumed non-tradables are not generally growth drivers, but can play important roles in supporting growth where it is being driven by minerals, by staples, or by traditional or nontraditional exports (tradables) as indicated elsewhere in the table. Domestically consumed tradables (which we define as products which can be imported but are not generally exported) are similar to domestically consumed non-tradables. Traditional or non-traditional exports (tradables), however have the potential to drive growth and can play an important role in the national economies of land locked countries without minerals and in regions of coastal countries that are poorly connected to ports.

What then are the major challenges and opportunities for increased productivity in

Table 1. Typology of Agricultural Products by Roles, Countries and Challenges and Opportunities

	Staple foods			Non staple products with productivity potential		
	High response cereals maize, rice, wheat	Low response cereals sorghum, millet	Roots/ tubers cassava, sweet potatoes	Domestically consumed nontradables	Domestically consumed tradables	Traditional / nontraditional exports
Broad Role	Pro-poor growth	Least cost welfare, growth platform	Pro-poor growth	Support growth, with staple spillovers	Support growth, with staple spillovers	Drive growth with staple spillovers?
Countries with Minerals	Support & spread growth	Subsistence, support & spread growth	Support & spread growth	Support & spread growth	Support & spread growth	Minor driver & spreads growth
Coastal, Nominerals	Regional driver & supports growth	Subsistence & support growth	Regional driver & supports growth	Support growth	Support growth	Regional driver & supports growth
Land locked Nominerals	Major driver & then supporter	Subsistence	Major driver & then supporter	Support growth	Support growth	Driver
Technology						
Challenges & opportunities	Irrigation?	Yield package?	Processing?	various	various	various
	Public goods (research, infrastructure, institutional environment)					
	Policy coordination					
	Complementary service coordination					
	Global commodity & product prices (profitability, input affordability)					
	Price instability (intra& inter seasonal)					
	Price / productivity tightrope					
	Input subsidies					
	Seasonal input finance					
	Climate change (direct & indirect impacts)					
	??Commodity boom??					
	Regional trade agreements					
	Changing domestic consumption patterns					
	Changing supply chains					
	Market system innovations					
	Macro economic & aid management					

smallholder agriculture for these different products? We investigate these in the following section, paying particular attention to those that are concerned with market access.

4. Opportunities, challenges and market access in agricultural intensification

Table 1 lists a number of opportunities and challenges affecting or potentially affecting smallholder agriculture intensification for different types of products. We consider these in turn, beginning (more briefly) with those that are directly concerned with market access and are considered in other papers. More attention is subsequently given to those that are more directly related to questions of market access.

4.1. Technical challenges and opportunities

Increasing staple food crop production in Africa faces serious technical challenges with regard to limited irrigation and uneven irrigation potential for high response crops, and the development of higher yield technologies for low response crops. These challenges are likely to be exacerbated by increasingly variable rainfall expected in many areas as a result of global climate change. Solutions will include the development of more drought resistant high yielding varieties, better soil and water management, and investment in irrigation. The technological developments, however, have to take into account the socio-cultural aspects of staple crops in Africa. For example, over the past four decades, there has been considerable investment in the development of high yielding varieties of high response staples in Africa, yet the adoption rates for such technologies remain low (Langyintuo and Mungoma, 2008). Since most of the smallholder farmers lack access to cash, they still prefer

traditional seeds that they can easily recycle rather than relying on seed varieties that have to be purchased every season to achieve maximum productivity.

The immediate technical challenge for cassava where it is widely grown in West Africa relates to reducing labour requirements for harvesting and processing through the development of new harvesting and processing technologies and/or of high yielding varieties with suitable harvesting and processing characteristics (Nweke 2004).

Technical challenges for non-staple products vary considerably between different crop and livestock systems and between areas. Pest and disease control, improved soil, water, crop and feed management are all important in different systems. Technical change is often dependent on improved market access in terms of the need for access to stable output markets offering remunerative prices and to input and finance markets to support the use of purchased inputs, machinery or labour hire, or investment in equipment or infrastructure. We discuss below the coordination questions regarding the need for complementary access to these different markets and to extension and research services.

4.2. Public good challenges

It is widely agreed that poor and limited transport infrastructure, under funded agricultural research and extension, weak institutions (in terms of formal and informal legal frameworks conducive to private sector investment in productive activities) and 'state failure' have been a significant constraint to agricultural development, and particularly staple crop development, in many parts of Africa. Although international donors, private foundations and NGOs can invest in some public goods (for example research and extension), the impact and sustainability of such investments generally depends upon wider supporting state systems. This is particularly the case for staple food crops. As will be discussed below, there are greater

opportunities for (particularly exported) tradeable products to develop coordination systems which support collective investments in research and extension services and in infrastructure. Nevertheless even here there are some public goods which are almost completely dependent upon a strong, competent and accountable state, and although civil society and external agencies can in some ways encourage good governance, there are many aspects of governance which ultimately depend upon longer term development of stable transparent and rule based political systems.

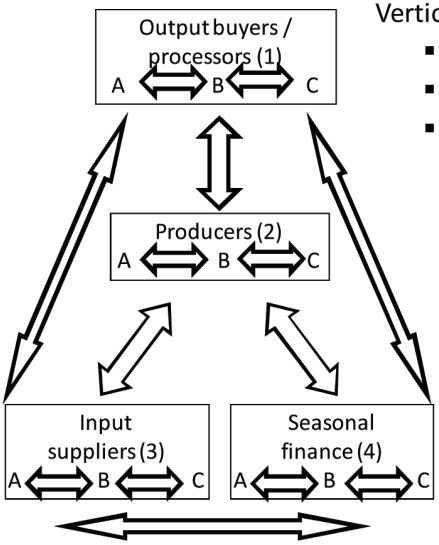
4.3. Coordination challenges

The importance of coordination ("effort or measures designed to make players .... act in a common or complementary way or toward a common goal", Poulton et al. 2004: p521) is a recurring theme across discussion of the causes of poor agricultural performance in Africa, particularly in high response cereals, and potential state interventions to subsidise inputs, develop credit and other financial systems, and stabilise prices.

We distinguish between three important and related levels of coordination which we term the micro, meso and macro levels of coordination.

At a micro level, producers need low cost and reliable access to output markets, and information about the behaviour of those markets. For increased productivity, farmers need access to technical production information and market and business information related to new production methods. They also require access to any inputs needed as well as finance for purchasing such inputs and perhaps for increasing their labour use. Some technologies may need access to particular production or processing equipment or services. Access to the different information, items and services needed for increased productivity needs to be coordinated in that the absence of just one of these may prevent

Figure 3. Vertical, horizontal and complementary coordination



Vertical: coordinated exchange (1-2-3&4)

- Specific assets & risks, thin markets
- Quality & timing
- Missing credit markets

Horizontal coordination: A-B-C

- Public goods (research, extension)
- Opportunism problems – credit, grading, staff development
- Fixed transaction costs & other economies of scale

Complementary coordination: 1-3-4

- Complementary service delivery & access

adoption of increased production methods and/or significant reduction of production or economic benefits from adoption. This need for micro level coordinated access to resources and services is needed not just by producers but by other actors in the supply chain too – for example input suppliers need access to finance, inputs, information about probable demand for inputs and prices, transport, storage facilities, etc. Produce traders have a similar set of information, service and capital demands, while technical and business extension services need financial, human, physical and informational resources. Each set of actors in a supply chain therefore requires access to complementary resources, services and information and must coordinate their own access to and use of these. The more complex a production system, in terms of its different resource, service and information needs, the greater the micro level coordination and management challenge and risks involved, and the greater the number of other actors each actor needs to coordinate with.

This leads to the meso-level coordination challenge, across the different actors: essentially each actor needs to be able to rely on and coordinate with other actors if they are going to overcome their own micro-level coordination challenges. This requires coordination across actors. It is helpful here to distinguish between three types of meso level coordination: vertical coordination along a supply chain, horizontal coordination between competitors performing the same function in a supply chain, and complementary coordination between providers of complementary services in a supply chain. The nature of and relationship between these different types of coordination are illustrated in figure 3.

The challenges in meso-level coordination increase with

- the complexity and number of factors and actors involved in the micro level challenges facing each actor, and hence along the supply chain as a whole
- the absence of existing actors and relationships between them in a supply chain or related supply chain
- the value of new investments at risk for any actor and the potential losses incurred in the event of a coordination failure.
- lack of trust, of strong institutions or of large potential gains encouraging actors to cooperate and discouraging actors from behaving in opportunistic ways for short term personal gain.
- particular informational or production features of goods, services and processes (examples include problems posed by the need for critical timing of delivery of particular goods or services – such as seeds or fertilizers - , or information difficulties regarding particular attributes of actors or goods or services – such as seed or fertilizer quality or credit borrowers' repayment intentions)

Thus where flourishing markets exist (with large numbers of players, good information and established norms of behaviour) then markets can provide an effective coordination mechanism for goods and services with private good characteristics (where investments in the production or delivery of these goods and services yield major direct benefits to the actors making such investments). Problems arise, however, where such markets do not already exist. Vertical, horizontal and complementary coordination may also be developed within firms – indeed, this is what large firms do. This is not possible with many small farms, although firms can provide vertical and complementary coordination around small farms, particularly if farmer organisations can provide horizontal coordination. Unfortunately the incentives for large firms to provide such coordination are normally weak in dispersed, risky and low value staple food crops markets.

As a result the development of more intensive high productivity staple food crop systems may suffer from meso level low equilibrium trap (Barrett, 2008; Dorward and Kydd,2004; Dorward et al, in press).

These difficulties, however, differ between different innovations and different crop types. Thus increasing root crop productivity based initially on improved planting material may not pose as many meso-level coordination challenges as cereal crop intensification involving investments in inorganic and seed input supply systems, knowledge intensive production innovations, and significant seasonal capital investments by input suppliers and farmers. Risks in root crop productivity innovations are also lower not just as a result of their lower seasonal investment requirements but also because the ability to store the crop in the ground reduces market and price risks for farmers.

Meso-level coordination problems can also be more easily overcome with some non-staple products, where higher potential returns in supply chains and barriers to entry (frequently in processing or in marketing) can provide (a) incentives for commercial companies to invest in complementary coordination mechanisms, and (b) incentives for farmers to work together in groups in accessing coordinated services. Contract farming and interlocking transactions can be effective meso-level coordination mechanism where there are limited numbers of produce buyers and/or long term stable incentives for farmers to work together in groups to access complementary finance, input and output market services. Such arrangements can exist in a wide variety of different production systems (cotton, tea, sugar, milk, tobacco, coffee to name a few) and in a wide variety of forms (for example in contract farming and in different forms of contract that interlock land, labour, input, output, insurance and finance markets with each other and with access to other services such as transport, health, food security and extension services). There can also be important spillover and dynamic benefits from such arrangements:

- Such interlocking arrangements often involve direct arrangements for the financing and purchase of inputs for staple food crop production by participating non-staple producers (see for example Chirwa and Kydd, 2005) or, with fungibility, help farmers to afford input purchases for staple crop cultivation (see for example Govereh et al,1999, Jayne et al, 2004)
- development of farmer organisations that facilitate coordination of production, input access and marketing services particularly works for tradeable non-staple products, but staples may benefit from this as well, as above (see for example Chirwa et al., 2007).
- local growth driver linkages (as described earlier in figure 1) can lead to a general growth in economic activity with increased density of economic activity reducing transaction costs and risks
- roads and communications infrastructure developed for non-staple markets will also benefit other economic activities, including staple foods markets (see for example Govereh et al,1999)
- similarly thickening of input and financial markets and services for non-staple producers may provide sufficient market activity to begin to overcome meso-level coordination problems for staple food crops

Recent growth in fertiliser use on maize production by smallholder farmers in Kenya appears to be due, in part, to such processes (Ariga et al, 2006; Minde et al, 2008). The third, macro-level of coordination is concerned with the need for coordination of policies and investment in public goods and services to support the meso-level coordination needed for individual entrepreneurs' or actors' micro-level

coordination of their activities. This is concerned with targeting and sequencing of provision of wider conditions needed for meso-level coordination between actors, and may involve meso- and micro-level action by the state and state agencies. Examples of specific macro-level coordination include policies and investments in road infrastructure; in agricultural research and extension service development; and in input subsidy and price stabilisation policies (as discussed later). These, however, also have to be coordinated with wider policies regarding macroeconomic and fiscal management, private sector development, tax and legal frameworks for businesses and cooperatives, education, and social protection. Macro-level coordination is both particularly important and particularly challenging in situations where markets are poorly developed, governments have restricted human and other resources, and information and governance systems are weak.

How may the coordination problems inhibiting more intensive staple food crop production, in particular, be overcome? Many of the specific recommendations made in the remainder of this paper regarding other opportunities and challenges are also concerned with addressing particular coordination problems in intensification of staple food production. In addition to these, however, there may also be possibilities for improved regional or national processes and fora that either seek to promote

- coordination between different actors involved in or potentially involved in a supply chain, or
- learning across supply chains or countries regarding experience of challenges and successes in developing meso-level coordination.

Multi-stakeholder discussions to improve the performance of supply chains are common in traditional export cash crop systems, but less so for staple foods. The wider range of actors (consumers as well as producers), at times with conflicting agendas, but rarely effectively organised for dialogue, may be some of the reasons for this. However, in the wake of the food crisis, one can expect the establishment of various bodies looking into the performance of food systems in across countries, and these could more explicitly recognise, address and share information about coordination problems, as discussed above. The aim would be to engage a wide range of stakeholders in developing strategies to:

- promote technology adoption for production intensification by both surplus and deficit producers
- at prices that poor consumers can afford
- including measures to reduce volatility of prices for the benefit of both consumers and producers.

The following sections of this paper discuss key elements of such strategies and how they fit together.

It may also be possible to promote engagement of different public sector, private sector and farmer organisation actors with mutual interests or potential mutual interests in the development of a specific part of a supply chain. The aim of such engagement would be to help develop trust and shared understanding of the potential benefits from better coordination, the challenges in achieving this, and mechanisms by which it may be achieved and maintained. It could then bring actors together in a set of facilitated meetings and/or in joint pilot activities clearly focussed on a particular problem or set of problems. While the primary focus of such activities would be on problem solving, attention should also be given to the potential wider benefits of developing among supply chain stakeholders relationships of trust and a common identification of constraints. The specific problems that such activities would focus on could include a wide variety of issues regarding, for example, technical aspects of

fertiliser formulations for particular areas and soils, systems for bulk orders and financing of seed and fertiliser inputs, the development of small agrodealer networks and roles, or the establishment and operation of interlocking arrangements to allow for farmer organisation members accessing inputs on credit.

Finally, coordination is undermined by opportunistic behaviour by players in supply chains – including governments. An important issue that arises at other points in this paper is the need for systems that limit the incentives and opportunities for short term opportunistic behaviour by governments, including policy inconsistencies and reversals on market development. There are potentially important issues here regarding the role of regional agreements regarding trade in food, price stabilisation, or input subsidies.

4.4. Global commodity prices

From early 2007 international commodity markets were affected by a series of price rises that were particularly severe in their effects on energy, grain and fertilizer prices. They have since fallen back considerably, though not back to their earlier levels. Prices of different grains and fertilizers have followed different patterns, and while there is general agreement about the list of short and long term causes of many of these price increases and subsequent falls, there is no clear agreement of understanding regarding the relative importance of some of these causes, nor of how they are likely to change in the future. As a result of the food price spike it is estimated that large numbers of people have fallen into poverty (approximately 100 million people globally, a 10% increase in poverty incidence, Ivanic and Martin, 2008)

Figure 4. Commodity price indices 1980 to 2020 (2005 prices, 2005=1)

Source: World Bank data

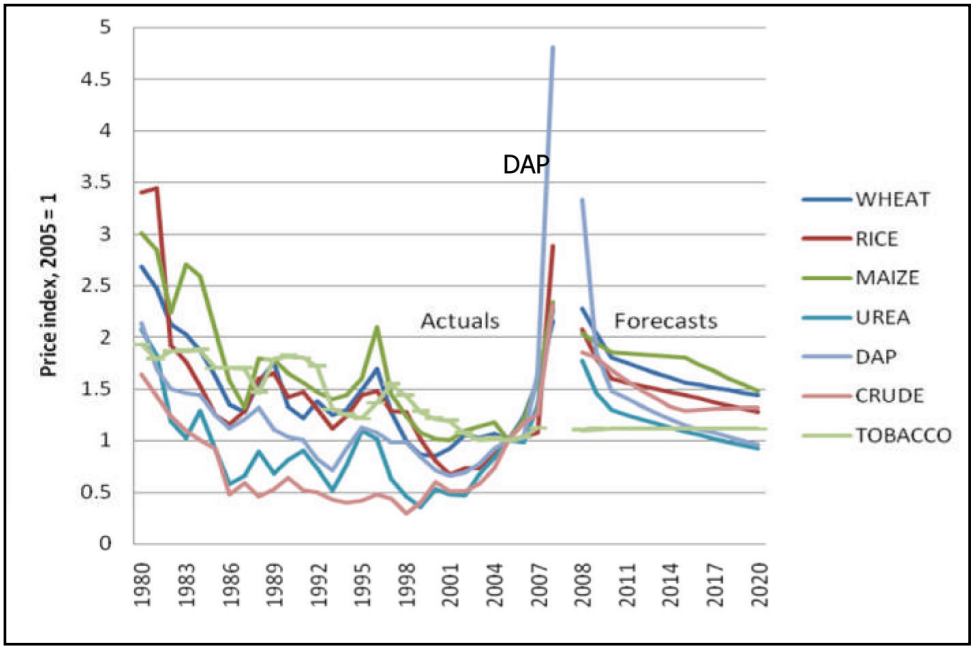


Figure 5. Commodity price indices Jan 2006 to Oct 2008 (2005 prices, 2005=1)

Source: World Bank data. Beverage price movements are similar to cotton

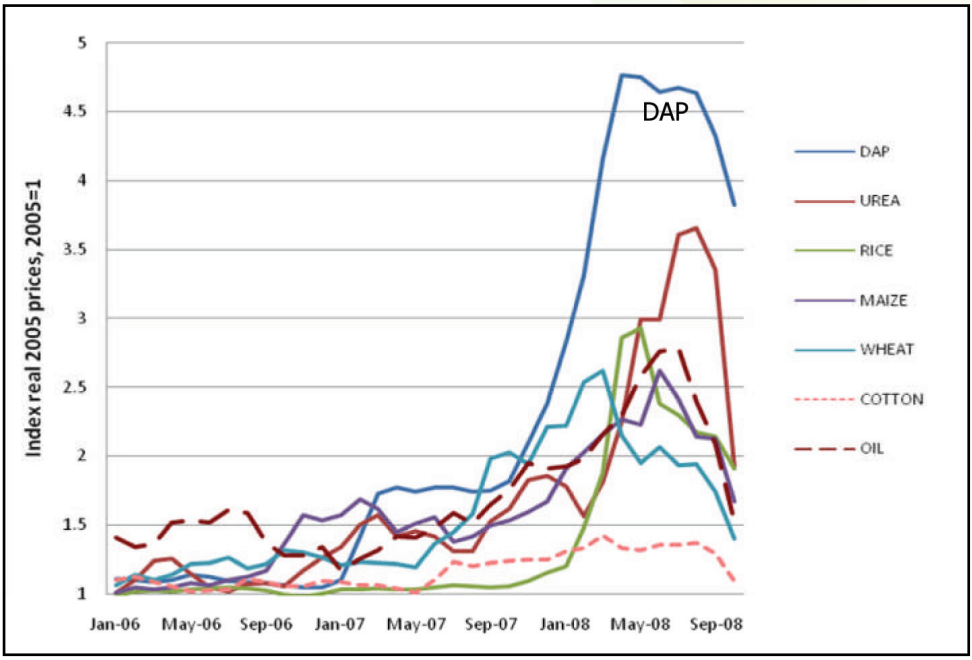


Table 2. Commodity price ratios, May 2008/ Jan-Mar 2007

May 2008/ Jan-Mar 2007						
Energy	Crude oil	2.1	Natural gas	1.5		
Fertilizer	Phosphate	8.1	DAP	3.5	Urea	2.1
Grains	Rice	2.9	Wheat	1.7	Maize	1.4
May 2008/ Jan-Dec 2006						
Energy	Crude oil	1.9	Natural gas	1.6		
Fertilizer	Phosphate	8.3	DAP	4.6	Urea	2.8
Grains	Rice	3.1	Wheat	1.7	Maize	2.0

.Source: World Bank pink sheets

Figure 4 provides some historical context to the prices at around their peak in mid 2008. Figure 5 provides more detail of how prices of major grains, oil and key fertilisers have changed from 2006 to April 2008. Table 2 emphasises the remarkable scale of the price rises over the

two years to mid 2008. High food prices pose complex challenges and opportunities.

There have been major damaging impacts on many consumers, reducing their real incomes. This is particularly serious for the poor and extreme poor, who already spend a large proportion of their income on food purchases. Coastal African cities have been hit hardest by this, with dramatic rice price increases affecting the urban poor and leading to riots in some cities. Rural food deficit producers have been less affected in the short term, depending upon seasonal deficits and surpluses and links to international markets, and the extent of local speculative behaviour. Prices in landlocked countries in East and Southern Africa appear to have risen in comparison with previous years, but there are considerable variations between countries, and the impact of global food price rises on food prices in land locked countries is not so clear. In Zambia, for example, dollar prices have been high, but the lower value of the dollar against the Zambian Kwacha meant that these high dollar prices have not been reflected in high real prices in Zambian Kwacha (Jayne, pers comm.). Prices in Malawi have been very high, but these appear to have been driven by local market pressures, and it is not clear how far these have been related to high international prices.

High food prices should benefit farmers who are surplus producers. However general statements that high food prices are an opportunity for farmers to benefit from higher produce prices generally fail to recognise that approximately 50% of farmers in many African countries are net buyers of food, and hence are hurt by high food prices. They also do not recognise the effects of fertiliser price increases.

Fertiliser price indices have risen more than maize price indices (see figure 5). This threatens both the profitability and affordability of fertiliser acquisition and use for national economies, governments and farmers [4]. Table 4 shows how European fertiliser price rises impact on Malawian prices (using a constant ratio of international to farm gate urea prices[5]) and how this then raises the breakeven price of maize required for its profitable use on maize (to achieve a value cost ratio – VCR - of 2) with two different grain: nutrient response ratios (a ratio of 20 is considered to be above average). Prices of $300 per tonne have occurred in Malawi in the past, at times of severe food shortage and hardship. Current 2008/9 urea and SAFEX futures prices ($1260 and $190 /mt respectively) mean that

Table 3. Malawian breakeven maize prices with changing urea prices[7]

Year	Urea price $/mt		Grain: N ratio	Maize prices $/mt			National maize stocks
	Europe	Malawi		B/E	Actual	SAFEX	
2006/7	220	470	15	135	100 – 160	250	surplus
2007/8	290	590	15	170	140 – 430	235	end year shortage
2008/9a	630	1,260	15	365	???	275-190	??
2008/9b	400	800	15	230	???	190	??
2006/7	220	470	20	100	100 – 160	250	surplus
2007/8	290	590	20	130	140 – 430	235	end year shortage
2008/9a	630	1,260	20	275	???	275-190	??
2008/9b	400	800	20	175	???	190	??

Source: adapted from Dorward and Poulton (2008)

urea use is expected to be barely profitable even with a grain:N ratio of 20[6]. For countries without minerals, high grain and fertiliser prices (coupled with relatively low prices for agricultural export commodities such as tea, coffee and tobacco) are likely to lead to an economic downturn and fiscal and balance of payments problems, further threatening investment, growth, food security and poverty reduction.

The maize and urea prices shown in table 3 and the discussion of the difficulties posed by high fertiliser prices highlight two particular challenges identified in table 1 (opportunities if they can be addressed): seasonal and intra-seasonal price instability and the price / productivity tightrope. We discuss these in turn.

4.5. Price instability

The different ranges of Malawi maize prices over the last two seasons suggest that there is considerable maize price instability both within and between seasons. This is shown more clearly for Zambia and Malawi over the previous 12 years in figures 6 and 7 (reproduced from Jayne et al. 2006).

Figure 6. Wholesale maize prices, Zambia, and import parity levels from South Africa

Source: Reproduced from Jayne et al. 2006, p330-331

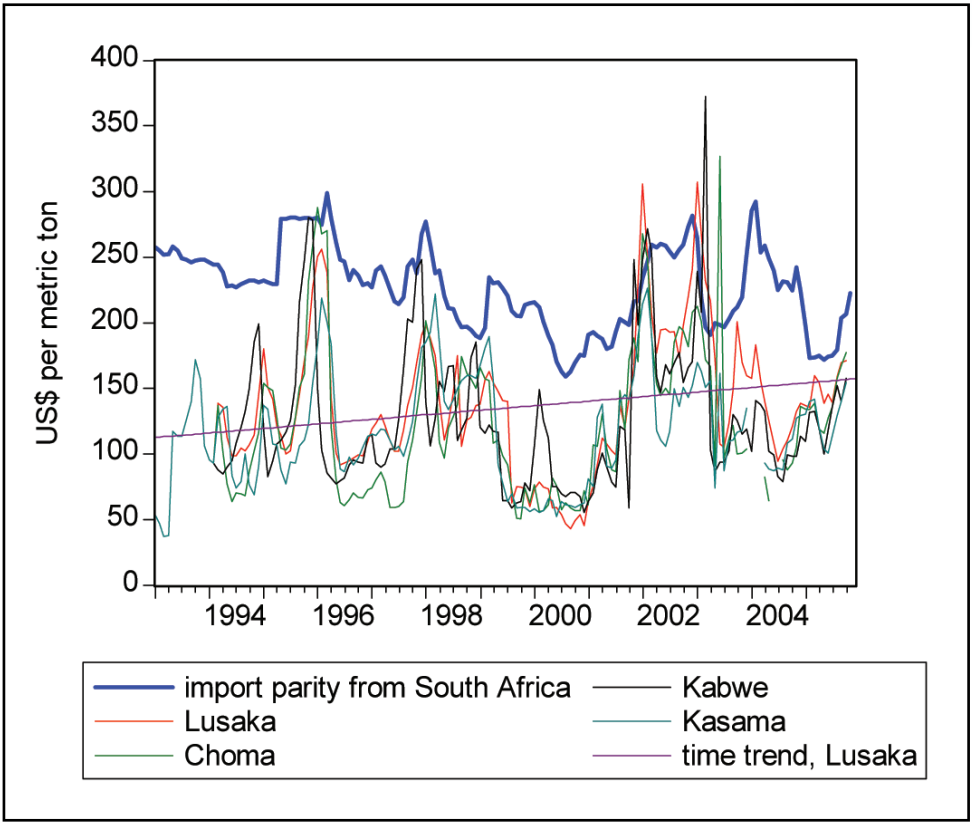
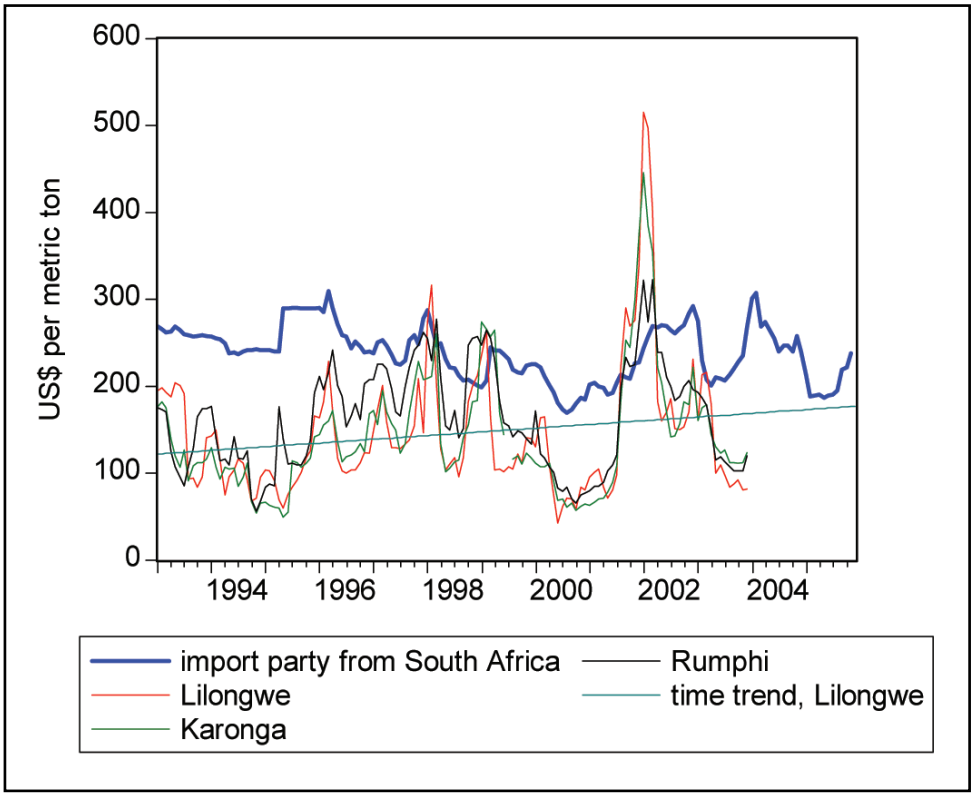


Figure 7. Retail maize prices, Malawi, and import parity levels from South Africa

Source: Reproduced from Jayne et al. 2006, p330-331



Byerlee et al. 2006 note that food price instability is a particular problem in countries where food consumption is dominated by a single major staple, as is the case for white maize in much of southern Africa. Across such countries they distinguish two principal sources of food price instability: the international market (as discussed above) and the domestic market. Domestic market fluctuations arise as a result of weather-induced harvest changes from year to year in landlocked countries where high transport costs to and from the coast create a large price band within which food prices can fluctuate in response to variations in the domestic harvest. In what follows, we focus on policies to manage price fluctuations around a mean price that is considerably lower than prices currently prevailing and that is compatible with reliable food access by low income consumers.

Price stabilisation was a central part of the policy set that encouraged the Green Revolution transformation of agricultural, and especially staple food, production in Asia (Dorward et al. 2004; Cummings et al. 2006). It is important not only to get mean food price levels right to encourage agricultural transformation in a low income economy; wide fluctuations around the mean can also have damaging effects on

Table 4. Who Is Affected by Food Price Instability and How?

Affected Group	Significance (in southern Africa)	Problem	Inter- or Intra-SeasonalVariability the Bigger Issue?
1. Poor Consumers	Majority of both rural and urban population; includes nearly all poor households	High prices reduce real incomes, especially in years of low harvest	Peaks in both
2. Net Deficit Producers	70-80% of rural households	As in 1 but high prices also discourage investment in high value crops	Peaks in both
3. Net Deficit Sellers	10-15% of rural households, including some of the poorest	As in 2 but also low price immediately after harvest reduces real income	Intra-seasonal troughs
4. Surplus Producers	20-30% of rural households; often non-poor, but important to food security of poor	Price collapse at bumper harvest and (to a lesser extent) low price immediately after harvest reduce real incomes and depress incentives for investment in intensification	Troughs in both, particularl intersea-sonal troughs

Source: adapted from Poulton et al. 2006; note that the first three groups are nested within each other.

investment. Table 4 distinguishes four groups of households that are affected by crop and food price instability.

We highlight three principal effects. Firstly, (potential) surplus food producers are discouraged from intensifying production if they fear that increased output could lead to price collapse at harvest time, robbing them of any gains from productivity enhancement and possibly even making them worse off overall. Inter-seasonal price troughs in years of particular abundance are the main concern here, as surplus producers generally have the resources to be able to hold back at least a proportion of their harvest, so as to avoid the worst effects of "normal" intra-seasonal price falls immediately after harvest.

Secondly (and in partial contrast to the first effect), a non-negligible proportion of producers - including some of the poorest - are unable to protect themselves against even "normal" intraseasonal price falls immediately after harvest. These households are constrained by cash shortage to act in a way that they know is sub-optimal, i.e. to sell when prices are lowest, and as a result are trapped in poverty through lowered returns on one of their most important activities.

The third effect impacts the largest group of households: all net deficit producers. In many cases, such households have no comparative advantage in producing staple foods (von Braun and Kennedy 1994). However, they continue to devote a large proportion of their land and labour resources to staple food production – rather than diversifying into higher value crops or even non-farm activities – because food markets are either too risky (Fafchamps 1992) or too expensive (Jayne 1994) to rely upon for their staple diets. Whilst food prices spike at (ir) regular intervals, such households will continue to prioritise resources to their own staple food production, unresponsive to initiatives that encourage them to participate in higher value activities. Two types of policy can support these households:

- Input subsidy programmes, if efficiently targeted, can benefit them both directly and indirectly: directly by helping them to intensify their staple food production through, so that they can meet their food needs on a smaller proportion of their available land (or meet more of their needs from the land that they do plant to food staples); indirectly by reducing food prices and raising rural wages;
- Specific measures may be taken to reduce food price volatility, so that households in low potential areas for staple food production feel confident enough in markets to transfer resources to alternative activities and rely on purchases to meet their staple food requirements.

As observed by Byerlee et al. 2006, there is widespread agreement on the problem of food price instability, but much less on what to do about it. However, there are some basics on which many observers do agree. Ultimately, a major aim is to make markets work more efficiently, so that price fluctuations are dampened by private investment in temporal and spatial arbitrage. One important requirement, therefore, is the removal of policy disincentives to private investments in grain storage and transportation. The chief of these disincentives is unpredictable interventions in food markets by governments and politicians, for example export bans, waivers on import tariffs for favoured players or distributions of cheap food from food aid consignments or state-controlled storage. Such interventions generally arise as a result of poor information on market conditions or from politicallymotivated opportunism.

The Zambia and Malawi maize price fluctuations shown earlier in figures 6 and 7 illustrate the harm done by ill-considered, poorly administered or ad hoc interventions. In both Zambia and Malawi, during the 1993-2005 period, large fluctuations are observed in domestic maize prices and also in the import parity price (as the cost of maize sourced from South Africa depends inter alia on the size of the local harvest in South Africa[8]). As already discussed, considerable fluctuation in domestic prices is possible due to the large wedge between import and export parity price (the latter unfortunately not shown in the figures). However, the most striking feature of these figures is that, in the years of the poorest domestic harvests, prices did not hit a ceiling at import parity, which they should have done had private markets been encouraged to function efficiently. Instead, mistrust between politicians and private traders meant that collectively the state and the private sector did not import sufficient maize to meet shortfalls. As a result, prices burst through the import parity price "ceiling" before imports (sometimes combined with food aid) eventually brought them down again.

At the other end of the price range, the lows in Figures 6 and 7 are likely to be below export parity, because private traders were not free to export maize when there were excess quantities within the domestic market. Whilst the extreme high prices are disastrous for poor consumers, the extreme low prices serve to discourage producers from intensifying their maize production.

For political reasons, if not also for economic ones, politicians are likely to continue to engage actively with staple food markets, given the importance of staple foods in the consumption baskets of their electorates (Dana et al. 2006; Poulton et al. 2006). Fundamentally, if governments have limited confidence that they can buy in maize from neighbouring countries when they are in need, they will be reluctant to let any surpluses that they do have flow out of their borders[9] – even though this reinforces the basic problem.

In turn, these fears can be attributed to at least three factors.

Firstly, historic production patterns indicate that there are crisis years, particularly in southern

Africa, when regional trade will not be adequate to compensate for domestic production shortfalls. Harvests within Southern African regions exhibit a degree of correlation due to covariance in weather events (see Table A2.2 for data for 1981-2005). Examples of correlation include Zimbabwe, South Africa and Zambia on the one hand and Uganda, Tanzania, Malawi and Mozambique on the other. By contrast, harvests across southern Africa on the one hand and eastern Africa on the other are rarely positively correlated. Unfortunately, neither are they negatively correlated, which would be ideal for price stabilization through trade. In three of the four worst drought years of the 1981-2005 period in southern Africa (1984, 1992 and 1995), the total harvest in eastern Africa was also below its long-term trend level, meaning that there was little surplus to sell southwards. Finally, as already observed, production variability is much greater within southern Africa than eastern Africa. Thus, the largest shortfalls in southern Africa greatly exceed the largest surpluses within eastern Africa.

The second factor, which exacerbates this, is that both southern and eastern Africa have moved progressively from maize self-sufficient or surplus towards maize deficit over the past decade or so (Jayne et al. 2006)[10]. Thus, maize is seen as an increasingly scarce commodity in the region as a whole.

Thirdly, there is in some countries considerable mutual distrust between governments and private traders, and there are considerable difficulties in breaking out of this. As a result of traders' fears of arbitrary government intervention in staple markets, traders are unwilling to invest in storage capacity or in grain purchases for temporal or cross border arbitrage. As a result if governments do try to keep out of the market in order to allow market arbitrage, traders respond very cautiously, and hence ineffectively. This then reinforces government views that private markets cannot perform essential price stabilization functions, and the government steps in (often late and ineffectively, as indicated by the earlier discussion of price fluctuations in Zambia and Malawi). This then reinforces traders' views of arbitrary government interventions.

What, therefore, is required to reassure governments that they can safely commit to respecting free cross-border trade in staple foods (good for price stability and also for the development of private sector trading and storage operations) and at the same time reassure traders that they can invest in temporal and spatial arbitrage? According to Poulton et al. 2006 (p347), therefore, the challenge is to manage state intervention such that:

- Politicians can be "seen to be doing something";
- The intervention actually makes matters better, not worse;
- It supports a dominant role for private storage activity, rather than undermining it;
- It is compatible with free import and export of food;
- It generates clear guidelines for the consistent management of food aid.

We suggest that the following is needed:

- An increase in production within southern and eastern Africa, such that maize is not perceived as a scarce commodity. Judicious input subsidy programmes may help here.
- A coordinated move such that several countries commit together to freer trade[11].
- Provisions for dealing with production fluctuations that exceed the capacity of cross-border trading to handle, as may occur in the worst drought years in southern Africa.

Encouraging free (i.e. not subject to administrative restriction) trade in food within southern Africa should be a major market policy objective. Further price stabilisation measures can include index weather insurance (as recently introduced in Malawi) and regional storage mechanisms

(Poulton and Dorward, 2008). Such measures will not solve all the price stabilization challenges of the region. However, it should avoid future episodes (such as those shown in Figures 6 and 7) where maize prices exceed import parity price or fall below export parity price. It would thereby remove the worst price volatility, even if policy might legitimately seek to go beyond this and further narrow the band within which food prices fluctuate.

4.6. The price/ productivity tightrope

The challenge of the 'price / productivity tightrope' identified in table 2 relates to a policy dilemma in staple food intensification because

1. producers need high returns from investment in new technologies in order to provide them with incentives to invest in productivity increasing technologies,
2. high returns need high food prices and/or low input prices and/or high output /input ratios
3. but poor consumers need low prices for food security, for welfare, and to raise real incomes to drive and support growth

This is a particular problem for cereal intensification, due to the higher investments needed in inputs, as compared with root crop intensification which, initially at any rate, requires a relatively low-cost switch to improved varieties through a one-time adoption of new planting materials. To encourage cereal intensification, therefore, policy needs to tread a fine line between providing attractive incentives to producers to adopt new technologies and keeping cereals prices low enough (and preferably declining in real terms over time) such that staple foods are readily accessible to poor consumers. High fertiliser prices raise particular problems here, as noted earlier in the discussion of the effects of high fertiliser prices in Malawi.

The logic of the food tightrope problem leads to the identification of the following broad approaches in dealing with it:

1. Raising physical productivity of inputs – through adaptation of technologies and farmer learning of how to manage them, and when (and when not) to use them
2. Reducing the costs of inputs by increasing efficiencies in (for example) fertiliser or seed production and/or delivery systems
3. Reducing farmers' input costs through input subsidies
4. Reducing the price margin between farm gate sales and consumer purchase by increasing efficiencies in (for example) grain purchasing, storage, and transport
5. Reducing the price margin between farm gate sales and consumer purchases by subsidising farm gate sales and/or consumer purchases
6. Raising the incomes of poor consumers through social protection subsidies (for example safety nets or targeted welfare payments)

In the long run raising technical and economic efficiency (points 1, 2 and 4 above), should provide the main solution to the food price tightrope problem, together with higher consumer incomes (as a result of economic growth). In the short run, however, the food price tightrope can be a major constraint to development in poor rural economies. Governments have tried to address this through different combinations of inputs subsidies, output price subsidies for farmers and for consumers, and social protection to raise the incomes of the poor. Coordination of these policies is a challenging but important example of the macro-level coordination discussed above.

Improved input productivity requires improved research and extension services providing farmers with affordable and profitable recommendations on improved soil fertility management (involving both organic and inorganic fertilisers). It is also important that transport and fertiliser import industries are encouraged to increase efficiencies in input supply systems. Direct general food price subsidies for consumers have proved to be very expensive and difficult to manage in the past, although targeted consumer subsidies (for example through food for work and food transfers) and targeted income support are increasingly common. These could be described as part of general moves in subsidies that involve switches from general to 'smart' subsidies and from loosely defined narrow objectives to tightly defined broader objectives. A similar pattern may be observed with regard to input subsidies, which we discuss here briefly

4.7. Input subsidies

Constraints on increased input use can be usefully considered in terms of supply and demand constraints. Fertiliser supply problems include high transport costs to landlocked countries and within rural areas, long lead times in placing orders, uncertainty regarding government interventions and farmer demand, small markets, limited access to working capital, and exchange rate risk. These problems are exacerbated by recent dramatic increases in oil and fertiliser prices, and shortages of fertiliser. Many similar problems are faced in seed supply, though they arise in very different ways.

Fertilizer demand problems include low profitability of high cost inputs, significant output price and weather risks, problems of affordability (given high fertiliser prices relative to the incomes of poor farmers), ineffective fertiliser use and hence low physical grain to nutrient responses. The latter are related to poor extension information, low/variable output prices, lack of financial services, late and unreliable deliveries, inappropriate formulations, low yield potential crop varieties, lack of complementary soil fertility management practices, and, at times, poor rainfall. There are many similar demand problems with seeds, though there are probably bigger issues with farmers concerns about seed characteristics other than yield (for example drought and pest resistance, storage and eating qualities) and about seed quality (in terms of germination and varietal characteristics).

Input subsidies can rapidly (but partially) address or help with many, but not all, of the supply and demand problems described above. They most immediately and importantly increase profitability of on-farm use and, if sufficiently large, can bring down the price sufficiently to also address the affordability problem[12]. However there should be long term goals that input subsidies (with building of roads, of research, and of farmers' technical and business skills) should over time lead to improved efficiency of input supply systems and use and to economic structural changes. These together should then allow profitable use of unsubsidised inputs at acceptable prices so that subsidies can be reduced and withdrawn.

A major conclusion from successful and unsuccessful experience with input subsidies is that they can make very significant contributions to food security, poverty reduction and economic growth (see, for example, SOAS, 2008, Minde et al, 2008). However, their benefits depend upon an effective basic input technology (in terms of its potential to raise yields of marketable produce), good programme design and implementation, and indirect subsidy impacts on staple prices, the rural economy and wages. These in turn require prior

and complementary investment in public goods (roads, agricultural research and extension, market development infrastructure). complementary policy and service coordination (regarding, for example, policies to encourage stable prices, social protection, private sector involvement and development, good fiscal management, and a clear national development strategy), political commitment to the implementation and goals of the programme, and the financial and organisational resources for coordinated implementation.

Critical issues regarding design and implementation concern

(a) programme scale (cost, subsidy volume and subsidy rate),
(b) the basic input supply system (the timing and processes for determining input requirements and for importation),
(c) input distribution networks (determination of approved subsidised input selling agents),
(d) beneficiary targeting,
(e) voucher (or other entitlement) system and distribution to beneficiaries,
(f) voucher redemption and input purchase by beneficiaries,
(g) voucher redemption by input sellers,
(h) financial systems as regards margins and payments for goods and services,
(i) performance monitoring and audit systems (including incentives for good performance and penalties for poor performance or fraud).

Many of these issues are strongly inter-related, so that particular design and implementation features have implications (and pose different advantages and disadvantages) across different issues.

There is considerable urgency in the need to improve the effectiveness of input subsidies as global commodity price increases lead to both increasing political pressures for governments to use the and increasing costs which threaten their profitability and affordability.

Governments, farmers, agro-dealers, fertiliser importers and distributors and seed companies need to work together to investigate, develop and implement good practice in input subsidy programmes.

This should involve a programme of innovative action research, evaluation, shared lesson learning, and capacity building, and should work at different levels. The following initiatives are needed:

- Cross country reviews of emerging input subsidy experience
- Improved integration of input subsidies with complementary policies
- Guidelines for determining programme scale: cost, volume, and subsidy rates
- Piloting of system innovations (targeting systems; voucher systems; remoteness incentives; audit systems & penalties; systems for stakeholder engagement, development of trust and commitment, and performance targets & monitoring)

4.8. Seasonal input finance[13]

Agricultural intensification, involving adoption of new technology embodied in purchased inputs requires capital. Small farm households are rarely able to save enough to fund significant intensification, whilst only a minority (normally amongst the better off) have access to sufficient nonfarm income sources for the purpose. Therefore, credit has long been recognised as a priority to support agricultural intensification (Feder et al. 1985). While there have been and continue to be successful models for delivery of seasonal finance to non-staple producers where complementary coordination problems can be resolved (as discussed earlier), state-supported and subsidised agricultural credit

programmes in staple crop production are widely perceived to have failed, as they were fiscally unsustainable due to both their subsidy component and repayment problems[14]. However, despite the subsequent success of hugely innovative microfinance organisations in providing financial services to poor clients (often much poorer than the average recipient of previous agricultural credit programmes), the modern microfinance industry in Africa is a predominantly (peri) urban phenomenon and only fairly recently has it begun to address the huge gap in rural financial service provision: rather than developing a better model for seasonal credit provision to poor agricultural producers than the previous, state-supported and subsidised agricultural credit programmes, microfinance has largely abandoned agriculture.

We identify five reasons why, left entirely to market forces, future progress in seasonal credit provision for smallholder agriculture is likely to be slow.

1. The price/ productivity tightrope: The dilemma was posed earlier that with high global fertilizer prices fertilizer use may only be profitable at maize prices which are damaging for the livelihoods and food security of large numbers of poor people. This problem is intensified if interest charges are also added to the price of fertilizer. Consequently credit for fertilizer application on maize by surplus producers is only likely to be viable with lower fertilizer prices, lower import costs, and more efficient use of fertilizer to gain higher grain returns to fertilizer application.
2. High transaction costs: Transaction costs associated with any (financial) service provision in rural Africa are high primarily as a result of (a) high costs in connecting with clients due to low population densities and poor infrastructure and (b) small transaction sizes where clients are very poor (as many of the costs associated with a financial transaction are fixed, irrespective of transaction value whereas the revenue for the financial institution is the interest payment, which is a function of transaction value).Thus, Johnson et al. 2004 conceptualise a "frontier" of rural service provision, whereby little financial service provision is occurring in areas where both the population density is less than 300 persons per km2 and the poverty rate exceeds 40% of the local population[15]. This excludes much of rural Africa.
3. Seasonal agriculture poses problems for conventional microfinance models as borrowers with highly seasonal incomes can only make very small payments at regular intervals, leaving most of their loan (perhaps all the principal and some of the interest) to be repaid at harvest time, and disbursing and collecting all loans at once removes one mechanism for ensuring loan repayment, which is to provide members of a borrower group with staggered access to loans, with some repaying their loans first before others are allowed to take theirs out. (Dorward et al. 1998; Morduch 1999). Both these features increase lending risks as, in a Grameen-style model, regular repayments signal that all is well with loan servicing while staggered loans and repayments provide group repayment incentives which can be undermined under conditions of covariant risk (Stiglitz 1990; Besley and Coate 1995).
4. High repayment risks arise from (a) the widespread culture of "strategic default" (Poulton et al. 1998) that loans are, after all, really gifts (encouraged by a history of poorly managed government and donor credit programmes with, in places, irresponsible political opportunism in newly democratic systems) and

(b) the combination of high climatic variability and low levels of irrigation in Africa, which mean that even many well-intentioned borrowers may struggle to repay loans in bad seasons.

5. Subsistence consumption: where farmers are growing staples partly for their own consumption then they will not get cash income for that part of the crop that they consume, and this may limit their ability to repay any production loan unless they have other sources of cash income

Given the multiple obstacles to seasonal credit provision in African agriculture, it is not surprising that microfinance has made little headway in seasonal finance in agriculture. In these circumstances we should expect most shifts in the lending "frontier" to be incremental, addressing one obstacle at a time. We can, for example, expect a restricted focus on larger more commercialized smallholder farmers in more productive and accessible areas, perhaps with significant non-farm incomes, and for production of higher priced crops (not basic staples)[16]. Even so there will still be significant challenges, with loan sizes still being small by international standards as a result of small farm sizes even among larger smallholder farms (Poulton et al, 2008).

Such challenges may be addressed by one of the major strengths of the microfinance industry, its international expertise and commercial dynamism and creativity in addressing problems such as those outlined above. Poulton et al (2008) review four innovations in financial service provision and assess their potential to reduce the costs of rural lending: so-called "branchless banking", involving mobile phone technology in the provision of financial services and the use of agents to deliver basic services to customers at lower costs than banks themselves can do; cost savings from transferring the current functions of loan agents to (presumably less well trained) agents; the use of group contact persons instead of the loan agent meeting directly with each individual borrower during the process of loan administration; and the use of bibliometric information (incorporated into smart cards) to enhance the quality of records regarding borrower repayment rates. They conclude though the use of such innovations may gradually become more common within rural lending in Africa, a period of (risky) experimentation will be required first. They therefore suggest that use of a carefully designed 'challenge fund' to take on the risks of such experimentation could significantly speed up the development and implementation of these innovations, and thus advance the spread of improved access to seasonal finance amongst African smallholders.

4.9. Climate change

It is helpful to recognise that global climate change impacts on smallholder agricultural development in Southern Africa in a number of different ways. Direct impacts include changes in average temperatures and precipitation, in their seasonal distribution, and in their variability. Indirect impacts are also important, and these may arise (and have already arisen) in a number of ways: through the impacts of climate change on large numbers of Southern African farmers' production decisions, outputs and incomes and the impacts of these decisions, outputs and incomes on local economies as they work through the local economy and changing; through regional and national policy responses to direct and indirect impacts of climate change; and through similar indirect impacts working through the global economy. Although there is continuing debate about the relative importance of different factors causing the recent global spike in food prices, both climate induced yield falls in some parts of the world, and climate change mitigation policies (promoting biofuels) are widely considered to be an important contributor to the price spikes in different food

commodities. Climate change is likely continue to have major market impacts.

4.10. A global commodity boom?

As earlier discussion of global prices showed, international commodity markets have shown dramatic change recently. In early 2008 there was widespread discussion of the effects of a commodity boom, particularly affecting oil and coal, minerals, timber and food. There was much talk of the importance of growth in China and India driving this boom, of new investments by China and India in Africa, of consequent changes to aid systems, and of impacts of these changes on African economies and politics. Such issues have received less prominence as commodity prices have fallen back, and as the Chinese and Indian economies have slowed with the global slow down. However there are still prospects of very high oil prices in the future (as a result of cut backs in investment in new capacity) and Chinese and Indian growth and strategic interest in commodity supplies continues.

There are a number of possible impacts of such changes on the issues considered in this paper. We highlight the following:

- High commodity prices may lead to increasing problems from the 'natural resource curse' for countries producing those commodities. These problems include 'Dutch disease' (with high exchange rates depressing growth in other tradable sectors, including food staples and non staple agricultural tradables) and political instability or authoritarianism with increasing emphasis on rent seeking, capture of rents, and non-productive investments.
- Good management of commodity income can, however, offer major benefits to economic growth, with increased government budgets, greater national ownership of development investments, and increased opportunities to invest in critical problems constraining agricultural, and particularly food staple, development.
- Some countries currently without mineral earnings may become 'countries with minerals' in table 1, with changes to the roles, opportunities and constraints for different agricultural products in economic growth.

4.11. Regional trade agreements

There is increasing interest in and commitment to the development of regional trade. This issue is being addressed by other papers in this conference. There are, however, clearly major implications for agricultural input and output markets – some of which we have touched on in discussion of staple food price stabilization.

4.12. Changing consumption patterns

Jayne (pers comm.) and other authors note that over the last twenty years or so there have been substantial shifts in staple food consumption in some countries in the region, out of maize and into (principally) cassava and wheat. Evidence for this varies in different countries. It is most strong in Zambia, with increased wheat consumption in urban areas and increased cassava consumption in some rural areas. Shifts from maize into cassava are also reported in Northern Mozambique and Malawi, although the evidence for these changes in Malawi is the subject of continued debate. The causes of these changes are thought to include (a) increases in urban populations, (b) reduced emphasis on and promotion of maize in agricultural and market policies, and (c) increasing difficulties in maize production as a result of climatic change, declining soil fertility, limited access to fertilizer.

A full discussion of these issues is beyond the scope of this paper, but we note here the importance of changing consumption patterns, and

particularly the importance of urbanization, on staple and non staple food crop systems.

4.13. Changing supply chains

A feature of increasing urbanization and of increasing urban incomes has been the growth of supermarkets in Southern Africa, with considerable differences in the extent of this in different countries (see for example Weatherspoon and Reardon, 2003. Hichaambwa and Tschirley, 2006). This has been accompanied by growth in non-traditional exports, many of which supply northern supermarkets, Reputational, branding, quality, food safety, reliability and adaptability demands of supermarkets tend to lead to their developing strong supply chain relationships with producers, and smallholder farmers are often disadvantaged in these relationships as compared with larger scale producers (see for example Poulton et al, 2005). Smallholder farmers can, under specific conditions engage with these supply chains, but all too often changing supply chains (generally in non-staple products) are a challenge and smallholders may need some coordination assistance (for example in working within farmer organizations and in developing links with supermarkets or fast food franchises) if they are to be able to participate in such chains.

4.14. Market system innovations

Recent years have seen a number of innovations in the use of new technologies and the development of new institutions in market systems. Much wider access to mobile phones has dramatically improved the access of farmers to market information in many rural areas, and this has been associated with the development of new services in market information and in money transfers, in particular. Although wider access to email and internet services has the potential to provide the basis for wider access to such services (World Bank, 2008) the development of such services in Southern Africa has been limited – indeed the density of such services and the level of economic activity necessary to support them may both be too low for their use outside more accessible and better developed areas by more commercialized smallholder producers linked into high value supply chains. Cash cards, smart cards (like the Malswitch card), barcode systems, scratch cards, and mobile phones have the potential to assist in interlocking transactions, access to financial and input markets and services, and in the delivery of input subsidies. Other institutional innovations include commodity exchanges, warehouse receipt systems, strengthening of farmer organizations, and participatory supply chain development involving chain facilitators, private sector investors ('chain champions') and farmer or community organizations.

4.15. Macro economic and Aid Management

Macro economic management is critical for government mobilisation of fiscal resources for investment in agriculture, for low interest rates and favourable business environments (for smallholder farmers and for private investors in market and other supply chain services), for wider confidence and trust in private sector / state relations, and for mobilisation and management of aid. Here we note that new aid relationships associated with the Paris Declaration and the recent Accra conference may create new opportunities and challenges in development financing and programming. Both better donor coordination and increased funding through direct budget support should allow governments to mobilise funding for effective large scale investments supporting coordination of food staple intensification as discussed above.

5. Conclusions

The critical need in most countries is for increased intensification of food staples in ways that address the price/ productivity tightrope and promote diversification – this is important for driving growth or spreading growth in almost all countries. It is also the area where coordination problems are greatest and where solutions are most difficult. Much greater attention to and investment in food staples intensification is needed. Private public partnerships are needed to combine state and market coordination, expertise and capital. Such partnerships should involve not so much formal investment partnerships but complementary investments and activities with transparent, clear and reliable policies; mutual accountability; and the development of trust. Food market development and input subsidies are likely to be the focus here, but they must be properly implemented by both public and private stakeholders, with clear limits on state action, and complementary public good investments from the state. Other market innovations should support this.

Non-staple products are important in more localised ways, in driving or supporting growth, but do not have the same scale or impact, and often support rather than drive growth. They generally need less explicit state coordination and investment, but the state can play an important role in facilitating (or not impeding) private and NGO coordination and investment.

An important task for improved intensification in smallholder production of both staple food crops and non staple products is capacity building in transparent and accountable farmer organizations to help in coordination of market access. Increased investments in infrastructure and public goods is also important, in all weather roads, information systems to support input and output market developments (by the private sector) in rural remote areas, and agricultural research services. Here it is important to have in place systems for lesson learning within and across countries, and action research.

Current challenges discussed in the paper do pose substantial difficulties for both staple and nonstaple products – but these challenges have also focussed national and international attention on the role of agriculture, and of agricultural markets, in poverty reduction and growth, and this is an opportunity that must be seized.

End Notes

[1] Parts of this paper draw on material previously presented in Poulton and Dorward, 2008

[2] The poor can of course also suffer where new agricultural opportunities lead to them being secluded from, for example, land access.

[3] Morris et al. 2007 present data suggesting that maize and rice tend to have higher fertilizer responses than sorghum and millet, but that for all crops the responses are highly variable and sensitive to rainfall, soils, fertilizer application methods and formulations, and complementary soil management practices.

[4] This may also lead to low adoption rates for improved varieties (eroding the gains that have been made in adoption rates) that heavily depend on use of fertilizers.

[5] Transport and finance charges increase in rough proportion to the international price. Current urea prices in Malawi are in line with this.

[6] $100 per tonne transport cost is added to the SAFEX futures price to calculate import parity price.

[7] 2008/9a and 2008/9b present information with May 2008 and October 2008 European Urea prices respectively. There is a lag of a few months between prices in Europe and in Malawi due to the time taken to organise and transport fertilizer consignments to Malawi. Malawi urea prices in October 2008 are somewhat over the 2008/9a indicated price of

$1260/tonne. SAFEX future prices fell from May to October 2008, leading to the range of prices shown for 2008-9 – and at the lower SAFEX prices even import parity prices would not make fertiliser profitable at a grain: N ratio of 15.

[8] Note that in some years Malawi also imports maize from northern Mozambique. The cost of this is considerably less than the cost of maize sourced from South Africa.

[9] This is analogous to the behaviour of poor, net deficit households that prioritise own production of food staples, rather than devoting land and labour to the production of higher value crops, because they are not confident that markets will supply them with food at a price they can afford as and when they need it.

[10] This can be attributed to: 1) South African producers switching out of maize following market liberalisation in the mid-1990s. (They have, however, increased production again recently in response to rising world maize prices); 2) the collapse in maize production in Zimbabwe post-2001; 3) the low or negative growth in per capita staples production in southern and eastern Africa since the 1990s, as investment in agriculture in general has declined.

[11] Note that this another element of coordination not discussed earlier in section 4.4

[12] Given limited financial market development (for both credit and insurance), cash constrained poor households may be unable to afford inputs at planting time even if economic analysis shows that use of those inputs would be profitable over the course of the production season.

[13] This section draws heavily on material from Poulton and Dorward (2008)

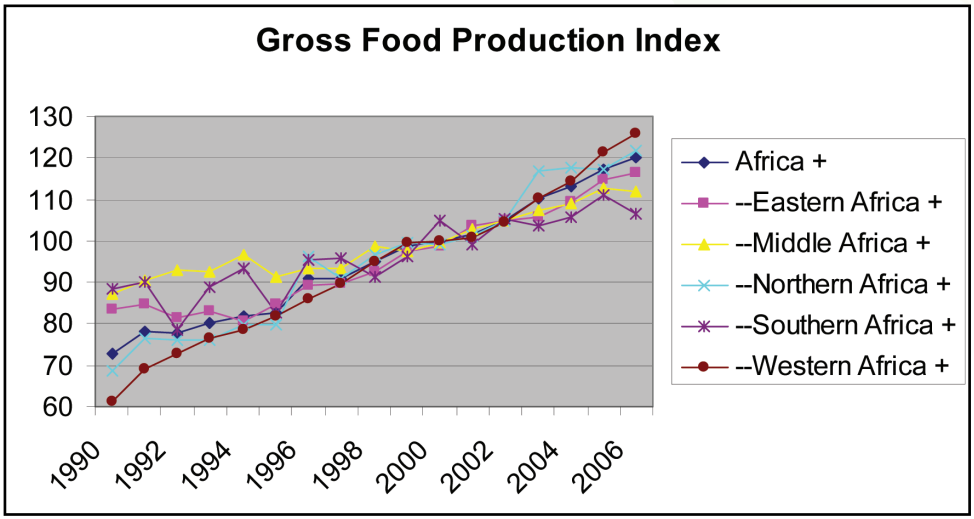
[14] Furthermore the subsidy component rarely benefited poor households, as the majority of loans were given to well-connected, wealthy borrowers (Adams and Vogel 1986; Yaron 1992)

[15] Their case studies were undertaken in Kenya, which has a relatively strong and innovative microfinance industry.

[16] For example in western Kenya the microfinance organisation SAGA has successfully launched a so-called "Mkulima Loan" product targeted at two groups of smallholder borrowers: vegetable producers selling to Kisumu markets (i.e. quite strongly commercialized with limited seasonality) and rice farmers on a large irrigation scheme (geographically concentrated with good communications, a high degree of commercialization and low weather risk). Some borrowers from FINCA in Malawi obtain seasonal input loans but make regular repayments during the season from non-farm income sources.

Annex 1. Food Production Trends in Africa, by Region

Source: FAOStat, June 2008



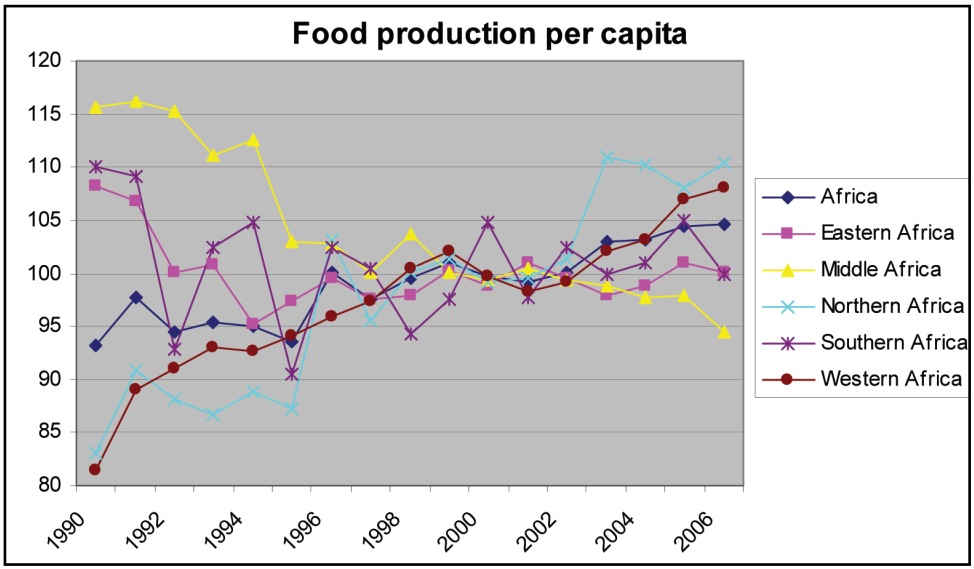


Table A2.1. Assessing Variability in Cereals Production by African Region

Region	Mean Annual Cereal Production 1981-2005 (tons) (1)	Standard Deviation of Differences from Longterm Production Trend (2)	Variability Indicator (3) = (2) / (1)
West	34,852,966	2,292,687	0.066
Eastern	19,559,571	1,665,103	0.085
Southern	18,265,245	3,951,625	0.216

Source: adapted from Poulton et al. 2006; note that the first three groups are nested within each other.

Annex 2: Variability in Staple Food Production in West, Eastern and Southern Africa

1) Assessing Variability in Total Cereals Production by African Region

Using FAOSTAT data for 1981-2005, total annual cereals production was calculated for the following "regions":

- West: Benin, Burkina Faso, Cameroon, CAR, Chad, DR Congo, Republic of Congo, Côte d'Ivoire, Gabon, Gambia, Ghana, Guinea, Guinea-Buissau, Mali, Mauritania, Niger, Nigeria, Senegal, Sierra Leone, Togo
- Eastern: Burundi, Djibouti, Eritrea, Ethiopia, Kenya, Rwanda, Somalia, Sudan, Tanzania, Uganda
- Southern: Angola, Botswana, Lesotho, Malawi, Mozambique, Namibia, South Africa, Swaziland, Zambia, Zimbabwe

Cereals included maize, sorghum, millet, rice, wheat and teff. To compare variability across regions, the following steps were taken:

- Total production in each region was regressed against a time trend variable. Over the period in question, there was strong growth in cereal production in West Africa (a gain of over a million tons per year) and in Eastern Africa (a gain of over just under half a million tons per year), but no significant trend in Southern Africa.
- For each year, the trend rate of production (calculated from the regressions) in West Africa and in Eastern Africa was subtracted from total recorded production in each region. For Southern Africa mean annual production across the whole period was subtracted from the total recorded production each year.
- Standard deviations of the resulting differences were calculated by region. These are shown in Table A3.1. (The mean of the resulting differences was zero in each case).
- These standard deviations were then compared against mean production in the region over the period as a whole. Table A3.1 shows that variability around the long-term production trend is much higher in Southern Africa than in Eastern or West Africa.

2) Correlations in Maize Production in Southern Africa

(See Table A2.2 on the next page)

Table A2.2. Correlations in Maize Production in Southern and Eastern Africa, 1981-2005 (source: FAOSTAT)

		Tanzania	Angola	Botswana	Lesotho	Malawi	Mozambique	Namibia	Swaziland	Zambia	Zimbabwe	SouthAfrica
Tanzania	Correlation	1	.470*	.127	.069	.385*	.658**	-.138	.063	-.030	-.261	.064
	Signif.		.012	.519	.728	.043	.000	.485	.749	.880	.180	.747
Angola	Correlation	.470*	1	-.014	-.093	.297	.808**	.098	-.230	-.275	-.458*	.145
	Signif.	.012		.944	.640	.125	.000	.621	.238	.157	.014	.461
Botswana	Correlation	.127	-.014	1	.418*	-.109	.041	.425*	-.144	.265	.358	.598**
	Signif.	.519	.944		.027	.579	.835	.024	.464	.174	.061	.001
Lesotho	Correlation	.069	-.093	.418*	1	.076	.103	-.061	.228	.342	.479**	.359
	Signif.	.728	.640	.027		.702	.601	.759	.243	.075	.010	.061
Malawi	Correlation	.385*	.297	-.109	.076	1	.593**	.002	.084	.097	.050	.107
	Signif.	.043	.125	.579	.702		.001	.993	.670	.624	.799	.586
Mozambique	Correlation	.658**	.808**	.041	.103	.593**	1	.140	-.004	-.266	-.250	.206
	Signif.	.000	.000	.835	.601	.001		.477	.986	.172	.199	.293
Namibia	Correlation	-.138	.098	.425*	-.061	.002	.140	1	-.406*	-.071	.006	.349
	Signif.	.485	.621	.024	.759	.993	.477		.032	.720	.974	.068
Swaziland	Correlation	.063	-.230	-.144	.228	.084	-.004	-.406*	1	.130	.394*	-.135
	Signif.	.749	.238	.464	.243	.670	.986	.032		.511	.038	.492
Zambia	Correlation	-.030	-.275	.265	.342	.097	-.266	-.071	.130	1	.502**	.326
	Signif.	.880	.157	.174	.075	.624	.172	.720	.511		.006	.090
Zimbabwe	Correlation	-.261	-.458*	.358	.479**	.050	-.250	.006	.394*	.502**	1	.502**
	Signif.	.180	.014	.061	.010	.799	.199	.974	.038	.006		.007
SouthAfrica	Correlation	.064	.145	.598**	.359	.107	.206	.349	-.135	.326	.502**	1
	Signif.	.747	.461	.001	.061	.586	.293	.068	.492	.090	.007	

** Pearson Correlation is significant at the 0.01 level (2-tailed).
* Pearson Correlation is significant at the 0.05 level (2-tailed).
N=28 in all cases

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