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African Food Systems to 2030: Toward Inclusive Business Models

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Abstract

Rapid population growth, urbanization and rising incomes will present an unprecedented opportunity for growth of commercial agriculture and agribusiness in coming years. The value of food consumed in urban areas is set to expand by four times to 2030, but given evidence of a continuing decline in competitiveness much of this could be sourced from imports even in countries with an apparent comparative advantage in agriculture. At the same time, the number of youth entering the labor force will rise to 25 million annually by 2025 putting tremendous pressure on job creation, especially through agriculture. Rising investments in large-scale farming seen in recent years may contribute to increased food supply (although this is highly uncertain given the track record) but some investment, especially in mechanized grain farms, provide few jobs. Even so there is a dire need for increased investment in the sector, both public and private, if it is to realize its potential for growth and poverty reduction.

This paper lays out a number of models of inclusive agribusiness growth, grouped into three categories (i) institutional arrangements for improving productivity of smallholders operating in spot markets, (ii) various types of contract farming arrangements, and (iii) large-scale farms that generate jobs and/or include community equity shares. The institutional and policy context as well as commodity characteristics that favor these models are discussed within a simple transactions cost framework. Examples of apparent successes with each of these models are provided, many based on direct interviews and case studies of innovative firms.

The final section discusses cross-cutting policy priorities to enable the growth of commercial agriculture and agribusiness. These include continuing reforms to liberalize product and input markets, access to technology and skills, stimulating financial and risk markets, securing land rights, and investment in infrastructure through public-private partnerships. Priorities differ by value chain and implementation presents challenges of delicately balancing state intervention and leadership with private initiative. These challenges are illustrated through examples from Africa as well as emerging countries of Asia and Africa.

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Introduction

Agricultural growth offers a singularly powerful instrument for stimulating broad-based economic growth and poverty reduction (World Bank 2007a). Evidence from cross-country analyses (Thirtle et al. 2003; Ligon and Sadoulet 2007; Christiaensen et al. 2011), studies of individual countries such as China that have been highly effective in reducing poverty (Ravallion and Chen 2007), and time-series village studies in green revolution Asia (Hossain 1988; Lanjouw, and Stern 1998; Hazell et al. 1991) all find strong poverty-reducing effects resulting from broad-based agricultural growth. These favorable equity outcomes result from the widespread income gains attainable from smallholder productivity growth, from rising rural employment, labor productivity and rural wages that benefit landless laborers and from productivity-driven moderation in food prices that especially benefits poor consumers (Lipton 2005). In addition, agricultural growth is the best prospect for significantly improving food security for many African countries, particularly those with limited infrastructure or inadequate resources to access food from global markets, and for millions of households in the hinterland with limited connection to markets.

However, not all types of agricultural growth generate favorable poverty-reducing outcomes. Global evidence suggests that in countries where agriculture has grown rapidly but where that growth has been concentrated among a relatively small number of large commercial farms, such as in Brazil, impacts on rural poverty reduction have been negligible (de Janvry and Sadoulet 2010). The lesson is that as Africa seeks to accelerate agricultural growth, it needs to pay close attention to the participation of the poor, especially small farmers in that growth process.

Over time, as agricultural growth and structural transformation proceed, Africa's rural households must navigate one of three primary pathways to the future. The first path centers on agriculture and involves transitioning from low-productivity agriculture into high-productivity commercial farming. The second pathway focuses on rural nonfarm businesses, including value added transformation of agricultural products, and wage labor in rural areas. The third pathway involves exit from rural areas and migration to Africa's growing cities (World Bank 2007a). Perhaps surprisingly, agricultural productivity growth offers a powerful stimulus facilitating transitions along all three of these pathways. Although two-thirds of Africans currently work primarily in agriculture, probably only a minority possess the management skills, asset endowments, financial resources and social capital required to succeed as commercial farmers along pathway one. Instead, the majority of today's subsistence farmers will need to transition out of agriculture over the coming generation along pathways two and three. To do so, they will require a boost in agricultural land and labor productivity, especially for women, that enables them to free their children from farm labor obligations, deploy oxen or hired labor in their stead, and use agricultural earnings to finance school fees that will prepare their children for successful careers in the rural nonfarm or urban economies.

This paper provides a review of inclusive models of agricultural growth along the first pathway, by exploring opportunities for expanding smallholder access to Africa's rapidly growing commercial agricultural markets. Though not discussed here, the paper recognizes that different policy priorities apply to the other two pathways out of poverty. The paper begins by assessing the generally optimistic outlook for African agriculture in a new context of booming market

opportunities, better policies and strong interest from the private sector. Although broadly optimistic, we recognize that there are important challenges to rebuilding African competitiveness. The main body of the paper then describes an array of business models that allow burgeoning private investment in the agricultural sector to be tapped to promote inclusive growth, especially to generate jobs to meet the looming “bubble” of youth entering the labor force over the next 20 years. One group of models centers on smallholder production, linked in various ways with large agribusinesses. These smallholder-based models offer the best opportunity for promoting inclusive growth. However, small is not always beautiful, and a second group of models recognizes that large-scale production will be needed in some circumstances. Even in these situations, potential exists for more inclusive growth through generation of good jobs or partnerships with local farmers and communities. For both groups of models, the paper provides examples of emerging success stories in Africa, noting also lessons from failures. Finally, the paper highlights key policy challenges and public investments that will prove critical in stimulating successful, broad-based agricultural growth.

Context: Major opportunities and challenges

Unprecedented opportunities for agricultural growth

Urbanization and a growing middle class in Africa are already leading to rapid commercialization of more diverse and higher value food products. In looking to 2030, African food systems are poised for take off. The return to economic growth in Africa since the 1990s, burgeoning urbanization, and buoyant global commodity markets now provide unprecedented market opportunities for Africa to develop a competitive and dynamic agricultural sector. The urban population of sub-Saharan Africa is projected to double by 2030, and with per capita income growing by four percent per year to meet the NEPAD targets, urban food markets are set to quadruple to US\$ 400 billion by 2030 (World Bank 2013). Rising food demand, both quantity and quality, will require not only rapid commercialization of African agriculture but major investments in processing, logistics, market infrastructure, and retail networks.

The diversity of Africa’s agriculture and climate also provides major opportunities for regional trade. At around US\$ 1 billion, intraregional trade in food staples currently accounts for only a tiny fraction of Africa’s US\$ 25 billion food import bill (Diao et al. 2007), although an unknown but significant amount of informal trade has emerged to meet rising cross-border demand (Whiteside 2003; Dradri 2007; FEWSNET 2008). Further, there is much potential for Africa to tap buoyant global markets not only in the traditional tropical exports (such as cocoa, rubber, cashews, and palm oil), but also higher-value horticultural crops, fish, and biofuels.

The supply side of agriculture also presents a major opportunity to provision growing food markets largely from within the region for at least three reasons. First, at a time when much of the world, especially Asia, faces an acute scarcity of land and water to expand agricultural production, Africa has an abundance of both. Almost half of the world’s uncultivated land considered suitable for expanding crop production is in Africa (some 200 Mha or equivalent to its currently cultivated area), although much of it is far from ports and roads (Deininger and Byerlee 2011). In addition, irrigation development in Africa, at less than five percent of cultivated area, lags behind every region of the world by far. Total economically exploitable

irrigation potential is estimated to be at least 39 million hectares—four times the current level (World Bank 2007b). Further, Africa’s crop yields are way below potential—often only 30 percent of those achieved in onfarm demonstrations. An important consideration, however, is that parts of Africa are already subject to more frequent drought and heat stress and will be affected more than any other region by climate change.

Second, the opportunity to exploit these natural advantages has vastly improved in recent decades with a dramatically better macro-economic environment for farmers and investors. From the 1960s to the 1980s, poor macro-economic policy was especially damaging to a tradable sector such as agriculture, along with high taxation of the sector to raise government revenues through export taxes or to keep food prices low for urban consumers. In 1980–84, governments “plundered” African agriculture with an average price of exportables only about half of the world price equivalent; this fell to a 19 percent equivalent tax in 2000–04 but remained the highest of any region (Anderson and Masters 2009). Reforms at the sectoral level have also progressed although at a much slower pace. Most parastatal operations in agricultural markets have been scaled back but continued and often erratic interventions in the form of border restrictions and government purchases and sales of food staples undermine private investment in food markets in many countries. Likewise, public expenditures on agriculture, which declined to four percent of budget expenditures in the early 2000s, are only now beginning to rise (ReSAKSS 2011).

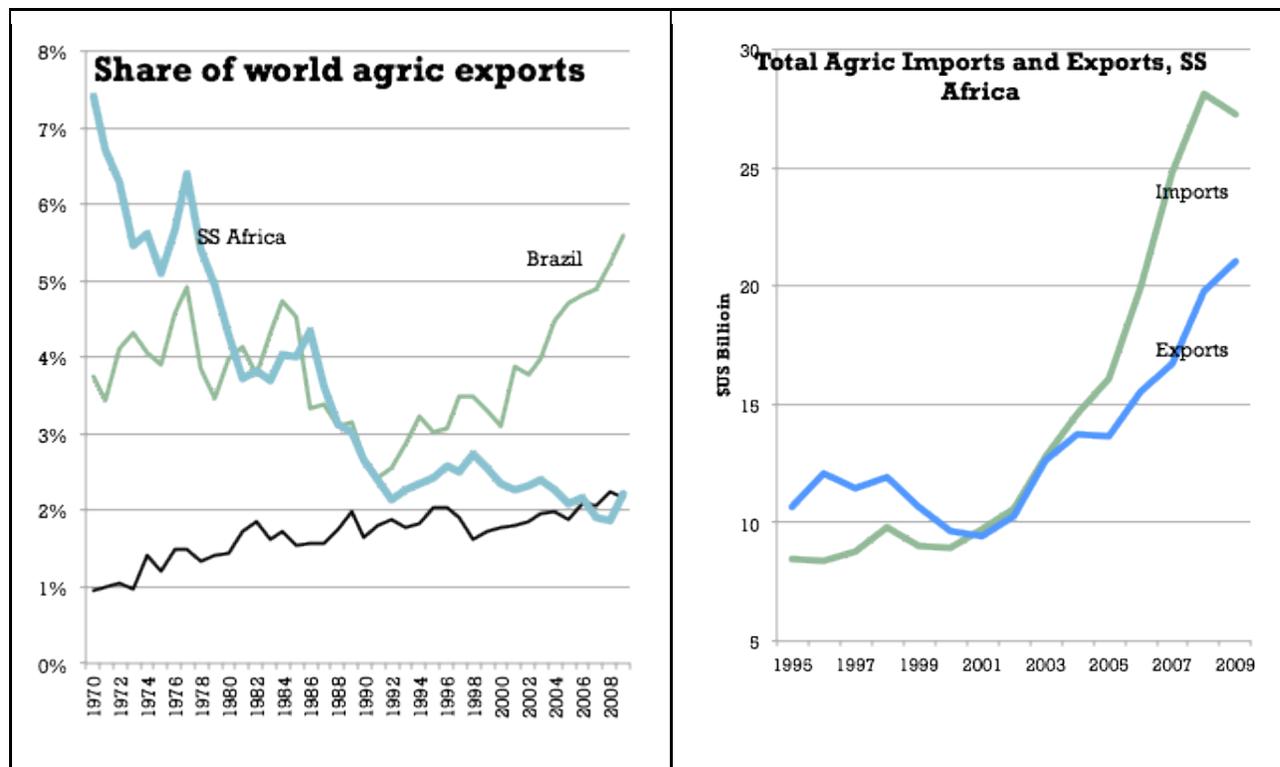
Third, overall incentives for private investment have greatly improved with better policies and sharply higher prices in the past decade. As a result African agriculture and associated industries are now favored sectors for foreign and local investors and private equity funds. The challenge is to harness investors’ interest in ways that generate jobs, provide opportunities for smallholders, and respect the rights of local communities.

Also major challenges

Despite this optimistic outlook, there are at least two major challenges that Africa must confront in order for agriculture to realize its potential. First, most African countries have been losing in the competitiveness race. Competitiveness as crudely measured by Africa’s share of global agricultural exports, has fallen dramatically for most countries and for many export commodities, even as higher commodity prices have stimulated a commodity boom over the past decade. Many developing countries, such as Brazil, Indonesia, and Thailand, export more agricultural products than all of sub-Saharan Africa combined (Figure 1a).¹ While Africa’s export shares are falling, Africa’s share of world markets for imports of many food products has been rising converting Africa in the past decade from a net food and agricultural exporter to a net importer (Figure 1b). Continued growth in domestic demand could increase food imports rapidly, despite Africa’s natural advantages in agriculture.

¹ South Africa, with its highly developed large commercial farms, is excluded from our definition of sub-Saharan Africa.

Figure 1: Share of Sub-Saharan Africa in global agricultural exports relative to Brazil and Thailand (left) and total agricultural exports and imports of Sub-Saharan Africa (right)



Source: Calculated from FAOSTAT.

Poor competitiveness in turn stems from low and stagnant productivity. Growth of total factor productivity was negative in the 1970s and 80s, but even since liberalization started in the late 1980s, agricultural productivity growth although positive is less than half of the average for developing countries (Fuglie 2012). The recent spurt in agricultural growth in Africa derives largely from expansion of the area sown. Use of modern inputs such as improved seed, fertilizer, and irrigation water remains very low, as does Africa's limited adoption of new generations of conservation agriculture and precision management technologies. Modern varieties, for example, were still only used on about one-third of the food crop area in 2010 (Arega et al. 2011).

Low productivity leads to high production costs that are reflected in high food prices. A recent benchmarking study of Africa's largest and fastest-growing import, rice, in two large importers, Senegal and Ghana, found that irrigated production costs were significantly above those in Thailand, and as much as twice as high in Ghana (World Bank 2013). Costs downstream in the value chain, especially in transport were also much higher. With high costs and significant protection in many countries, rice prices in Africa are on average double those in Asia (FAO 2013).

Regaining competitiveness in the sector must be combined with concerted efforts to address the second major challenge of creating jobs. Cohort projections indicate that by 2025, some 25 million young Africans will enter the labor force annually. Even with rapid rates of urbanization, rural population is projected to continue to rise beyond 2030, so some two-thirds of these jobs will need to be created in rural areas, either through more productive farming or in the rural nonfarm sector, much of which is closely linked to growth in the farm sector (Losch et al. 2012). A further implication is that farm size will become even smaller unless ways are found to better utilize the available land and water resources. Even urban jobs will greatly depend on growth in the food system in input supply, processing, logistics and retailing (Haggblade 2011).

Inclusive business models: Overall framework

Family farms overwhelmingly dominate world agriculture. Although varying greatly in size from smallholders of 1-2 ha in much of the developing world to relative large commercial farms of hundreds of hectares in high-income countries, they are distinguished by family ownership of most assets, family management, and permanent labor largely provided by the family. Many authors have discussed the unique attributes of agriculture that favor family farms—the spatial dispersion of production and dependence on nature that in combination give rise to site specificity in the production process, seasonality of labor demands and uncertainty about day-to-day tasks (Allen and Lueck 1998; Lipton 2009). Each leads to transactions costs, such as labor supervision costs and location-specific management that are internalized in family operations providing efficiency advantages to family farms. In economies with rising wages, family farms, initially small scale, generally adopt labor-saving technologies and gradually increase average farm size in order to raise labor productivity and allow farm incomes to match growing nonfarm incomes.

African agriculture is dominated by smallholder family farms cultivating an average of 1-2.5 ha (Jayne 2012). The structure of agriculture in Zambia is not atypical of much of Africa. For the main food staple, maize, recent surveys in Zambia indicate substantial differentiation of smallholders (defined as less than 20 ha) in terms of their market orientation. Just three percent of better-resourced producers (group 1) with average maize area of around 5 ha, using hybrids and fertilizer, account for half of all smallholder sales and achieve incomes on average above the \$2/day poverty line (Table 1). Another 36 percent of farmers (group 2) account for the remaining half of smallholder sales but on average, achieve incomes below the \$1/day poverty line. The remaining 62 percent who sell no maize (group 3) are even poorer and are often net purchasers of maize. In addition, there are a growing group of emergent farmers, averaging about 70 ha (Sitko and Jayne 2012), and a few large agribusiness farms with irrigation, that grow a range of crops, including maize, that together may account for 15-20 percent of maize sales.

Table 1: Characteristics of smallholder maize farmers in Zambia, 2007

	Top 50% sales	Bottom 50% sales	No sales
% of households	3	36	62
Cultivated area (ha)	7.2	2.5	1.7
Maize area (ha)	4.8	1.1	0.8
Maize yields (t/ha)	3.4	2.1	1.2
% hybrid seed	97	56	31
Fertilizer (kg/ha)	247	175	64
% animal power	67	25	19
% tractor power	4	0	0
Income/capita (\$/yr)	841	250	171

Source: Chapoto et al. (2013).

Among cotton producers, a greater proportion of Zambian smallholders (20 percent) are able to attain top-tier commercial smallholder status (i.e., accounting for half of sales), although on average they are below the poverty line (Table 2). Strong support from ginnery-run contract farming schemes – including guaranteed input financing, strong extension support and guaranteed output markets – assures wider participation of smallholders. Horticulture commercialization in contrast, is even more highly stratified than maize. Only one percent of horticulture farms account for half of the value of total sales. Higher input costs, higher risk and higher per hectare returns result in a narrower subset of well-resourced farmers able to master the full set of agronomic, financial, marketing and labor management skills required to succeed consistently in high-value horticulture markets (Chapoto et al. 2013).

Table 2: Concentration of commercial sales among Zambian smallholder farmers, cotton and horticulture, 2007

	Top 50% sales	Bottom 50% sales	No sales
Percent of growers			
Cotton	20	80	0
Horticulture	1	46	53
Income per capita (\$US/yr)			
Cotton	325	136	
Horticulture	1389	221	187

Source: Chapoto et al. (2013).

For the purpose of this paper, we focus on commercial smallholders with potential to feed the rapidly rising urban markets—that is groups 1 and 2, and those from group 3 (group 3a) who have the potential to commercialize, given better access to assets and markets. That still leaves a large number of subsistence-oriented farmers (group 3b) whose alternatives are to improve production for household food security, work off farm or migrate. A high priority is to design agricultural programs aimed at this group, such as disease-resistant and nutritious varieties of food staples, as well as developing skills and assets to move into onfarm pursuits. A dynamic commercial smallholder sector (our focus) oriented to rapidly expanding markets offers the best opportunity to absorb new entrants to the labor force, as well as to stimulate employment in the nonfarm economy.

Given trends in markets toward high value and quality products, commercially-oriented smallholders (both current and potential) increasingly require access to specialized assets and services where transactions costs of individual small family farms may be high. These include:

- Access to downstream markets that demand precise timing and stringent quality control
- Access to specialized technology and management skills
- Access to capital (both investment and working capital), and means to mitigate risks.

In the past, many of these services were provided by the public sector, at least for basic food staples. This worked well in Asia where heavy public investment in agriculture and strong government leadership stimulated the green revolution (Djurfeldt et al. 2005; Falcon forthcoming; Otsuka and Larson 2013). However, long-term underinvestment by the public sector in African agriculture and declining capacity to deliver government services has largely undermined the success of similar efforts in Africa.

At the same time, growing private agribusiness companies can potentially offer many of these services since larger and more specialized enterprises can capture scale economies in providing them. This leads to a variety of ways of organizing value chains. First, processing and marketing firms can choose to integrate upstream to secure supplies by engaging in direct production in large-scale operations. Second, specialized processing and marketing enterprises can contract with smallholders for agreed product delivery, in return providing inputs, finance, and advice. Third, farms themselves can vertically integrate downstream through collective action (e.g. cooperatives, farmer associations) to overcome their asset gaps. Finally, agricultural input firms can profit from embodying services such as improved technology and technical advice through input sales (e.g., hybrid seed).

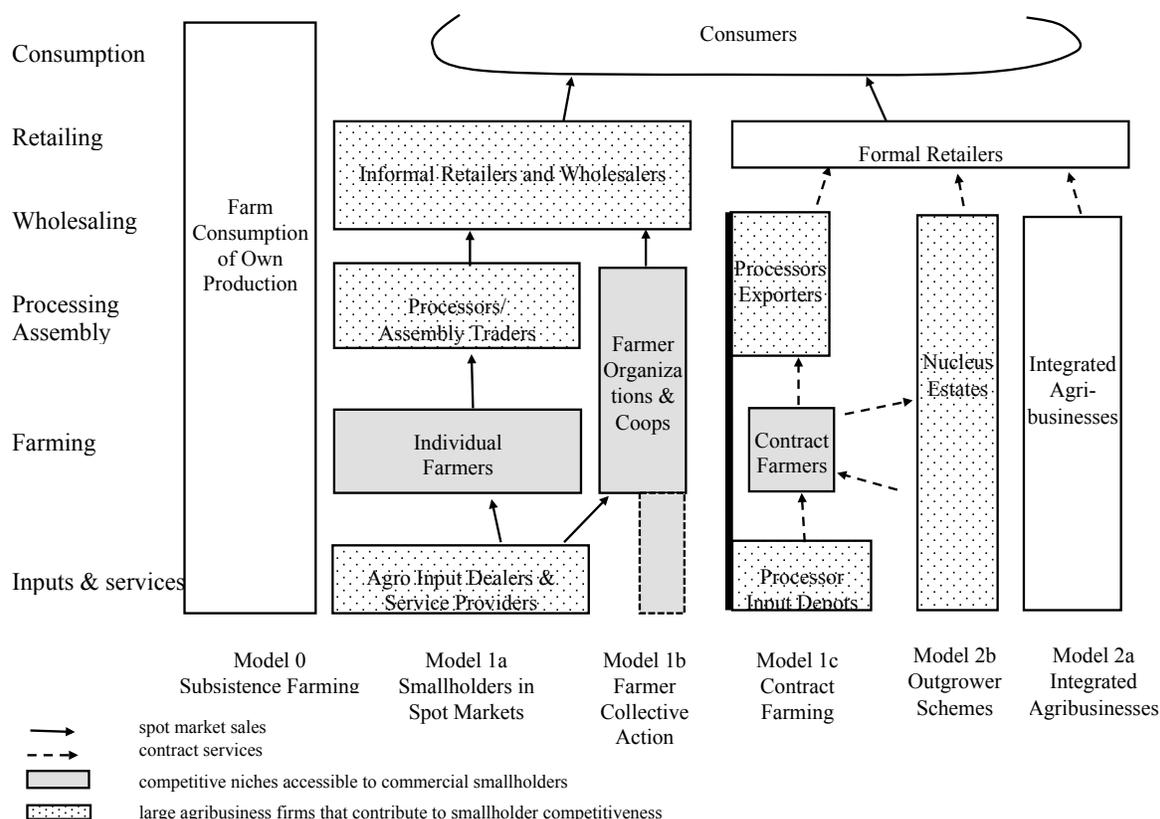
How these organizational arrangements play out in practice depends on relative transaction costs. To downstream companies, vertical integration into large-scale production incurs transaction costs of labor hiring and management, and accessing land. These factors are expected to be higher for more labor-intensive products and in areas of higher population density or with poorly functioning land markets. These costs have to be balanced against transaction costs of contracting such as identifying farmers and organizing and enforcing contracts that are expected to be higher for unorganized small farmers and for products that have demanding product and process standards. Finally, collective action by farmers to integrate forward has well-known transactions costs of organizing farmers and avoiding free riders.

Note that none of these arrangements are exclusive and combinations are possible. For example, contracts may be made with collectively organized family farms through associations and cooperatives, companies may undertake direct production to assure minimum supplies while contracting with out-growers, or companies may engage in direct production providing equity shares to locals in return for provision of labor or land. However, the type of arrangement matters in terms of how the returns to land, labor and management are distributed. Further, many value chains have dualistic structures serving different markets—an informal sector of smallholders and small and medium enterprises serving low-income consumers and a formal sector of larger enterprises to accommodate high-income consumers and exports.

Models based on smallholder production

Our discussion of alternative business models starts from the current situation where commercial smallholders dominate most food markets in Africa. In the simplest model, which holds for most food staples, smallholders operate individually in spot markets for inputs and outputs (Model 1A). A refinement of this model emerges where organized smallholders, in the form of farmer associations or cooperatives, collectively provide some of the critical services to access assets and markets or take on downstream activities like marketing and processing or upstream activities like input procurement (Model 1B). In a third model (Model 1C), farmers individually or collectively enter into formal contractual agreements with larger enterprises downstream to deliver a product, usually specified in terms of quality and time, in return for provision of inputs and technical advice (Figure 2).

Figure 2. Alternative business models for smallholder agriculture



Model 1A: Atomistic farmers operating in spot markets

Most food crops throughout Africa are produced by masses of smallholders acting individually and buying and selling in spot markets made up of many small- and medium-scale intermediaries². Maize value chains exhibit these characteristics, and given that maize is the most important food crop in Africa and one that has received a lot of state support, we use maize to illustrate this model (Smale et al. forthcoming).

Until policy reforms starting in the 1980s, parastatals dominated input supply and marketing in most countries where maize was the dominant staple. Aided by generous subsidies to inputs and marketing that included pan-seasonal and pan-territorial prices, many countries experienced episodes of rapid uptake of seed-fertilizer technology and respectable yield gains (Byerlee and Eicher 1997). Kenyan smallholders were among the first in the world to widely adopt hybrid

² Settings where large farms play a significant role in maize production include the former settler economies of South Africa, Zambia and Kenya. Historically, large-scale colonial era land allocations and persistent early subsidies were instrumental in the establishment of these large-scale farming blocks (Deininger and Binswanger 1995).

maize, leading to a doubling of maize production from 1965-80. In West Africa, rapid expansion of maize into the savannah areas in part to replace tubers and sorghum was stimulated by availability of new earlier-maturing and disease-resistant varieties and fertilizer (often subsidized) resulting in an eight fold increase in production from 1980-2010. Overall, however, area expansion has remained the basis of production growth, and in most cases (with West Africa as the major exception), output gains stalled as costly state programs proved inefficient and unsustainable.

Structural adjustment programs starting in the 1980s resulted in attempts to reform inefficient parastatals and a move to more private sector involvement in input and output markets. However, policy reform has generally been incomplete and policy interventions, including donor priorities, have often been ad hoc and unpredictable. As a case in point, continued arbitrary and often erratic state intervention in maize trade has undermined incentives for private traders to engage in marketing and storage in a number of important maize producing countries (Jayne 2012).

In recent years, many countries, led by Malawi, have strongly reverted to subsidy programs. To stimulate input use, targeted, voucher-based subsidies were conceived as “smart” alternatives because they were intended to encourage development of a network of input dealers and serve the needs of poorer growers. While there have been some successes with these programs in increasing maize production, in practice they show many of the weaknesses of earlier subsidy programs, including “crowding out” the private sector, high fiscal costs and elite capture (Dorward et al. 2011; Smale et al. forthcoming).

Nonetheless, private capital can play an important role in stimulating smallholder productivity operating in atomistic systems. Input supply companies and input dealers can be a powerful force for promoting input intensification. Hybrid maize seed is a classic example where private companies were in most cases crowded out by parastatal seed companies. With liberalization from the 1990s, the number of private seed companies in Eastern and Southern Africa increased by four times from 1997-2007, especially local companies (Langyintuo et al. 2008). Over 60 percent of maize varietal releases were hybrids developed by private seed companies, with most activity focused on Kenya, Zambia, and Zimbabwe. Similarly, Burkina Faso has increased cotton production by more than 50 percent after a local seed company made an agreement with Monsanto to acquire genetically engineered cotton resistant to insects, and smallholders rapidly adopted it in the space of three years. As discussed later, better integration of seed markets regionally would provide a major incentive for private seed companies to expand these activities, although their role will remain limited for many food staples by the difficulty of appropriating benefits for open pollinated crops.

Likewise, the privatization of fertilizer imports and distribution has seen some progress, although state intervention in fertilizer supply chain remains pervasive in many countries. Fertilizer prices in Africa are at least 30 percent higher (far higher for inland locations) than in Thailand, which also imports most of its fertilizer (IFDC and Chemonics 2007). In Kenya, liberalization of fertilizer imports combined with efforts to build a dense network of input suppliers through training and business development services has substantially increased smallholder fertilizer use (Ariga and Jayne 2010). Fertilizer prices paid by farmers declined steeply in relation to import prices, and the average distance farmers from an input dealer also decreased from 8.1 to 3.4 km during 1997-2007.

On the output market side, there are also good examples of private investment in processing that have opened new markets for African farmers. The growing demand for livestock products in rapidly developing countries is leading to markets for feed grains which are being supplied by a new generation of emerging commercial small- and medium-scale farmers in countries such as Ghana and Zambia. In livestock itself, Zambeef, a Zambia company, has expanded into West Africa by setting up modern meat processing works that procure locally to supply a growing market that was previously dominated by imports (World Bank 2013).

Still, long-term increased investment in core public goods is the only option for putting production of maize and other food crops in atomistic smallholder systems on a sustainable growth path. This follows the green revolution model in Asia, where even countries such as Thailand that depended largely on rainfed agriculture have been able to build global competitiveness in a range of agricultural products, based on sustained support to smallholders (World Bank 2009). In a recent review of maize sector performance in Africa, Smale et al. (forthcoming) conclude that policies and investments in public goods such as rural roads and market institutions to stimulate the development of private input and output markets are equally, if not more important than the development of new technology for future maize productivity. African governments have consistently underinvested in agriculture, spending less than half of what Asian countries have spent for decades (as a share of agricultural GDP) (World Bank 2007a). Sustained political commitment over decades is needed to reverse this trend (Poulton et al. 2010).

Model 1B: Collective action by farmers

Collective action by farmers can overcome some of the failures of the state to provide basic services. A case in point is action by farmer organizations to collect levies on commercial crops or imports to finance research and extension. In Côte d'Ivoire, producer organizations support research and extension through the Fonds Interprofessionnel pour la Recherche et le Conseil Agricoles (FIRCA) collected on export crops and on rice imports that fund most research and extension in the country. At present, this type of funding mechanism has been realized for only about 20 percent of commercial crop production in Africa but offers much potential for helping to overcome the gross underinvestment in research in Africa (Byerlee 2011). Perhaps more importantly, putting farmers in the driver's seat for funding research and extension programs has generally sharpened the orientation of these programs to farmer problems and enhanced delivery impact on the ground.

Collective action can also be effectively organized beyond production to include other actors in the value chain. So called innovation platforms are being extensively tested in Africa for food production, bringing organized farmers at the local level together with input suppliers, processors, financial institutions and research and extension to identify and coordinate a series of actions to overcome bottlenecks along the value chain. Early results in terms of improved productivity and poverty reduction have been promising but it remains to be seen if they can be successfully scaled up (Sanyang et al. 2012; Pamuk et al. 2012).

Another option is for organized farmers to integrate forward in the value chain to provide processing and marketing services, through cooperatives or farmer-owned companies. One of the

most successful examples is for tea in Kenya, one of the world's top tea exporters. There the Kenyan Tea Development Agency Ltd (KTDA), a private company fully owned by smallholder tea producers, provides inputs and advisory services to 550,000 smallholders with an average of 0.4 hectares of tea and management services for 63 smallholder-owned processing factories. With strong support from donors and government, KTDA built on the infrastructure, technology, and know-how provided from investments in large-scale estate production. In 2008, smallholders accounted for a 62 percent share of national tea production and the yield gap between smallholders and estates had fallen from 68 percent in 1980 to 18 percent (Mitchell 2012). Building strong farmer organizations is a prerequisite to replicating such successes.

Model 1C: Contract farming

Contract farming is an agreement between a downstream processor or buyer and farmers, either individually or in groups, on one or more of three elements: (i) the quantity, timing, and quality of product delivery usually for an agreed price, (ii) provision of resources, such as inputs and technical advice to be repaid at harvest, and (iii) production processes required to meet food safety and certification standards (Minot 2007; Prowse 2012). In developing countries, resource-providing contracts have been used for many years for some products, with process standards more recently added to many contracts. The bulk of evidence suggests that contract farming raises incomes of participants relative to their situation prior to the contract, and relative to neighboring farmers who do not have contracts (see for example, Eaton and Shepherd 2001; Simmons 2002; Swinnen 2007; Prowse 2012). In recent years as the risks to local communities from companies acquiring large land areas to engage in direct production have been recognized, contract farming has often been seen as a panacea since it combines the complementary assets of the investor (access to markets, technology and finance) with those of smallholders (access to labor, land and local knowledge).

Given transactions costs discussed above, contract farming is most common for perishable products and for products and/or qualities that are not widely available in spot markets, where buying companies have monopsony or quasi-monopsony powers and can readily enforce contracts. Companies may also favor contract farming for labor-intensive products and areas with poorly functioning land markets in order to reduce transactions costs in accessing and managing those production factors. Contract farming is most commonly found in sugarcane, tobacco, dairy, poultry, export horticulture, and some oilseeds. Conversely it is least likely for storable low-value products that are already widely traded on spot markets, such as grains (Swinnen 2009; Minot 2007).

Still contract farming has a limited role in Africa. One obvious issue from the company side is the high transactions costs of contract enforcement beyond the few products already noted above where there is a narrow marketing or processing channel. There is some scope for reducing these costs through regulation, producer associations, and institutional innovations. These are demonstrated by the rapid spread of contracting for cotton in southern Africa even where several companies operate in the same region (Chapoto et al. 2013; Tschirley et al. 2009). In Zambia, for example, an innovative approach to franchising input and credit distribution to representatives from local communities has allowed high credit repayment by some 200,000 smallholders now engaged in contract farming of cotton (Yagci and Aksoy 2012).

There has been a recent spate of activity to extend contract farming to grain and other food crops that are widely traded in spot markets and where costs of contract enforcement are high. Some such as the Ghana Grains Partnership claim success (Guyver and MacCarthy 2011). Groups of 5–10 farmers who are financed to plant hybrid maize in blocks of about two hectares per farmer sign a contract to supply the maize to Wienco, a private input and produce trading company. In 2010, nearly 3,000 farmers planted a total of 5,600 hectares, with average yields of four tons per hectare—more than double the average for the region. It is not clear how sustainable the model will be on scaling up to the target of 200,000 tons of maize, given current high maize prices that encourage side-selling. The recent withdrawal of Olam, a large Asian food trading company, from contract farming of rice in Nigeria, after earlier claims of success, to invest in its own large-scale rice farm, illustrates these risks.

From the side of smallholders, unequal negotiating powers in contracts arising from the monopsony buying powers of companies may enable companies to extract a disproportionate share of the surplus (Glover 1986; Clapp 1988) and some evidence supports this proposition. For example, the share of the export cotton price received by farmers in Zambia has fallen from 65 percent to 45 percent during 1998-2008 (Yagci and Aksoy 2012). Strong farmer organizations are clearly one way to improve farmers' bargaining powers as shown by the successful farmer lobbying for cotton reforms in Mali during the 1990s (Bingen 1998).

Public policy can also help to harmonize interests and expand opportunities for contract farming. Successful contract farming systems require clear regulatory systems, good monitoring mechanisms and clear systems for contract enforcement. Many times legislation is required, as with Zambia's Cotton Act of 2005 that established a new Cotton Board to regulate side selling and enforce input supply contracts (Tschirley and Kabwe 2010). There may be a role for governments in helping to negotiate a pricing formula and in dispute resolution.

Models based around large-scale production

Given factor prices in Africa, smallholder production is likely to be most efficient for most products as well as more equitable (since the smallholder receives combined returns from labor, land and capital). Yet in some situations, scale economies arise from processing, market characteristics and high initial fixed costs give large-scale production a strong efficiency advantage (Deininger and Byerlee 2012). Where such advantages are significant, large-scale production may be also more equitable if it produces more jobs than a less productive smallholder sector.

Factors favoring large-scale production

1. *Processing scale.* The most widely accepted economic argument for large investments in farming derives from a combination of significant economies of size in processing and the need to closely coordinate harvesting with processing for products that deteriorate rapidly after harvest (Binswanger and Rosenzweig 1986; Shlomowitz 1984). The best examples are sugarcane, oil palm, tea, and sisal, the so-called "classic plantation crops" that require processing within about 24 hours after harvest. Export of fresh horticultural

products that requires close coordination with shipping is a similar case. High costs of organizing smallholders around a tight delivery schedule that maximizes mill or shipping capacity and reduces harvest losses, as well as the risks of contract ‘holdup’ frequently means that these crops are grown by a vertically-integrated milling or export company. The size and nature of an optimum production unit in these crops is thus highly dependent on the scale of the milling or export operation. Large economies of scale in milling, as in sugarcane/ethanol, then translate into higher efficiency of large-scale production operations.

2. *Demanding product standards.* Economies of scale may also arise from increasingly stringent public and private standards governing the production process and product quality. These first emerged for food safety where relevant aspects of quality such as levels of pesticide residues are not readily observable, so that control of the production process is important to meet standards. The emergence of social and environmental certification now required by many consumers in global markets, has added to the premium on process standards (Swinnen 2007). In domestic markets, urbanization and the rapid expansion of modern food systems (especially supermarkets) are also heightening demands for compliance with standards for processed and fresh products. Because the cost of certification has a high per farm fixed cost element, the cost of certification for small farmers can be high—in some cases as much as half of production costs (Mausch et al. 2009). Downstream companies also incur significant transactions costs to supervise a large number of smallholders in order to ensure compliance especially since process standards often require product traceability from farm to fork. In fresh horticulture exports, where such standards are ever more stringent, there is evidence of large companies—often exporters themselves—assuming a greater share of production, at the expense of smallholders (Maertens et al. 2011; Jaffe et al. 2011). The added cost of certifying smallholders poses even greater challenges for commodities such as palm oil that are lower value. Still, industry-led certification programs are expanding to many traditional tropical exports as more buyers in high-income countries focus on social and environmental sustainability.³
3. *Scale issues associated with pioneer investments.* Sub-Saharan Africa has large areas of low population density that are suitable for expanding crop production. Expansion of agricultural cultivation to remote regions especially if associated with introduction of new crops, requires significant investments in infrastructure and technological experimentation, which represents a considerable risk that may initially favor large operators who are able to access the necessary resources and expertise (Collier and Venables 2011). Large companies with relevant experience elsewhere and their own R&D capacity may be better able to experiment or to establish transport and logistics in cases where the public sector is unable or willing to do so.

However, one would expect that such costs and risks would fall as the industry develops undermining the advantage of large-scale production versus smallholders. Rubber cultivation in Asia is an example where smallholders have essentially taken over

³ These include initiatives such as the Roundtable on Sustainable Palm Oil or Responsible Soy, the Better Sugar Initiative, and EU biofuel standards that have been put in place over the past decade.

production once the initial technology, infrastructure and markets were in place by large private estates (Byerlee 2013). A strong public R&D program or public expenditures in infrastructure as in earlier settler economies can substantially reduce these pioneering risks and favor the early emergence of smallholder production structures.

Further, in very low population density areas, ensuring a sufficient supply of labor is a challenge and for some crops establishing fully mechanized operations to minimize labor may be profitable. In the Cerrado of Brazil and more recently the Guinea Savannah of Africa this may partly explain the emergence of large mechanized farms even in countries with low average wages (World Bank 2009).

The above considerations indicate that there is an important role for investors in large-scale agricultural production for certain commodities and markets, notably plantation crops and horticulture, and some contexts such as remote regions. Large-scale operations can generate substantial benefits for local communities if they create good jobs, especially if competitive wages are complemented by training programs for employees and educational and health benefits for families. These enterprises can also play a role in local economic development by building infrastructure and generating tax revenues.

As in the previous discussion of smallholders there are a number of business models for large-scale enterprises involved in agricultural production. Enterprises may sometimes be operated as specialized farming companies or more commonly as vertically integrated companies (Model 2A), or they may enter into partnerships with smallholder outgrowers usually smallholders (Model 2B).

Model 2A: Integrated agribusiness enterprises

Development impacts of large enterprises involved in farming depend importantly on their potential to generate good jobs. Employment generation potential is much greater for high value crops and many traditional tropical exports whether viewed in terms of jobs per ha or jobs per dollar invested (Table 3). In Africa, horticultural exports, often produced by medium and large enterprises, provide a major source of employment both in production and in packing and shipping in countries such as Kenya (McCulloch and Ota 2002). Still horticultural exports represent only 16 percent of Africa's agricultural exports, and aggregate employment generation potential may be greater in traditional exports. For example, among the largest recent investors in Africa are the oil palm companies from Southeast Asia that have committed to invest several billion dollars. Given that these companies have a profitable track record in a similar tropical environment, they provide an enormous opportunity to rejuvenate an industry that originated in Africa and to generate growth and employment, provided that the lessons of social and environmental risks from the Asian experience are heeded.

Table 3: Examples of job creation and investment per job created for a variety of large-scale projects

Project	Jobs/1000 ha	Investment \$/ha	Investment per job
Horticultural exports, Kenya	3400 +	na	na
Oil palm + mill, Indonesia	350	\$4,000	\$11,400
Sugar (mech)-ethanol + mill, Sierra Leone	200	\$14,000	\$20,000
Sorghum (semi-mech), Sudan	53	\$900	\$17,000
Wheat-soy (mech, irrig), Zambia	16	\$6,000	\$375,000
Soy (mech), Brazil	18	\$3,600	\$200,000

Source: Interviews with companies.

On the other hand, large-scale farming of annual grain and oilseed crops has fared poorly in Africa in the past outside of the settler economies of South Africa, Zimbabwe and Kenya where large farms received preferential policies and land allocations (Deininger and Binswanger 1995). Partially mechanized sorghum and sesame production in Sudan, which captured investors' attention after the 1970s global food crisis, illustrates the risks and holds lessons for current investors. The scheme expanded rapidly when financing from Persian Gulf states aimed to transform Sudan into a regional breadbasket through favorable access to land and subsidized credit for machinery. The scheme grew to around 11 million hectares, attracting civil servants and businessmen, most of whom hired managers for their farms of 1,000 hectares or larger. Due to inexperienced managers and weak research and extension most of these farms rely on a low level of technology. In an agro-ecological environment comparable to one in Australia where sorghum yields are four tons per hectare, sorghum yields are only 0.5 tons per hectare and have been stagnant or declining (Government of Sudan 2009). Land rights of traditional users, both small-scale farmers and pastoralists, have been widely abused contributing to serious conflict and land degradation (Johnson 2003; Pantuliano 2007).

A similar lack of success has occurred with large-scale production of food grains in other parts of sub-Saharan Africa such as the large wheat farms in Tanzania and Nigeria in the 1970s and 1980s that have now largely been abandoned. The experience of recent investors has also been mixed, as evidenced by case studies that have found social impacts to be negative more often

than positive, largely due to lack of respect for existing land rights (Deininger and Byerlee 2011; FAO 2012a; Norfolk and Hanlon 2012). Despite high commodity prices, many investments, especially in biofuels, struggled to achieve profitability and many have been abandoned.

Still, some longer standing investments in food crops show potential. Examples are Mpongwe Development Corporation's irrigated maize and soybean farms in Zambia (building on several previous attempts) (FAO 2012a) and Tilden in irrigated rice in Uganda (Rukuni and Kambanje 2011). Given high up-front investments in irrigation, rising imports and high domestic prices, the production of irrigated rice is favored by many of the new wave of investors, and could succeed with due attention to traditional land and water rights, and use of appropriate technology.

Equity share holding by local communities offers a possible model for better aligning community interest with large agribusiness operations. Under these agreements, local communities receive equity holdings in new companies often in exchange for access to community land and water resources. These arrangements, promoted by the companies themselves or underwritten by donors, may be part of land deals with local communities or designed to build and reward employee and local community support. For example, under the Chiansi irrigation project in Zambia, smallholders in the region have agreed to long-term leasing of land to professional farm companies. Farm companies pay for operation and maintenance costs for the entire irrigation system, including irrigation provided to smallholders. In addition to the rent paid by the farm companies to the landowners, smallholders will over time also have the option of buying shares in the company (InfraCo 2010). Equity share arrangements that seem to work well in other regions, such as those employed by the New Britain Oil Palm Company in Papua-New Guinea, to access land and a number of other joint venture models described by Vermeulen and Cotula (2010) also seem relevant to Africa.

Model 2B: Outgrower schemes

The benefits of successful large-scale investments can often be greatly enhanced through outgrower schemes associating smallholders with a large nucleus farm. Different to contract farming, outgrower schemes focus on providing initial investment capital for smallholder participation. Investors may co-finance crop establishment up front and agree to process the product, but these arrangements may or may not involve contracts for input supply and technical assistance. Perennial crops such as sugarcane and oil palm are especially amenable to outgrower schemes, since they require a high initial investment to establish a crop that may not provide a harvest for several years. Investors usually like to include a nucleus plantation to ensure a minimum feedstock supply for their processing facility, but they may lack the labor and management resources for a larger plantation. At the same time, smallholders rarely have the capital to invest over several years prior to the first harvest, so an agreement with an investor to develop the plantation for later transfer to smallholder management and ownership is often in the interest of both parties.

There are many examples of outgrower schemes in Africa that seem to be working well. For example, the Zambia Sugar Company supplements its estate production on 10,500 hectares at Nakambala with cane supplied by independent commercial farmers (4,400 hectares) and through the Kalaya Smallholder Out-grower Scheme (2,164 hectares) managed as an extension of the

company's estate. Members of the scheme undergo six months of hands-on training in cane production after which each farmer is given four hectares of cane to manage and 0.5 hectares for homestead and food crop production with costs subtracted on delivery of the cane (FAO 2012b; World Bank 2013; Tyler 2008). Similarly, many of the large oil palm operations, such as the Ghana Oil Palm Development Company, include outgrowers (Vath 2012).

Governments and donors can reduce startup costs of outgrowers to investors and farmers by co-financing initial investment costs for smallholders, such as tree crop establishment or irrigation. A recent review of mostly successful outgrower schemes in Ghana revealed that donors had in each case co-financed such startup costs (FAO 2011). Alternatively, governments can decree that agribusiness investment projects include a certain percentage of smallholders, in return for concessions on land or tax incentives; as in Indonesia where land concessions required 20 percent of land to be allocated by companies to outgrowers.

Policy requirements for broad-based agricultural growth

A wide variety of business models can stimulate inclusive agricultural growth in different contexts, but success depends on an enabling policy environment. Although the policy environment for agriculture has improved in recent years, in some countries dramatically so, policy reform remains an unfinished business that risks undermining agricultural growth, whether from smallholder based models or other models based on large-scale production. The discussion below identifies a series of key policy challenges that must be addressed in order to transform Africa's growing market opportunities into broad-based, sustained agricultural growth.

Regional market integration

Commercial smallholder farming involves a shift from low-productivity, subsistence agriculture to high-productivity market-oriented farming. As a result, policies that affect input pricing and availability, price risk and market access all become crucial for stimulating smallholder agricultural growth. Regional integration offers significant potential for improving smallholder performance and competitiveness in all three of these arenas.

1. *Market access.* Given Africa's pervasive 'small country problem', the promotion of regional trade offers one of the most effective "quick wins" for improving market efficiency and market access. Currently, Africa's arbitrary, inherited political borders frequently separate the continent's many surplus food production zones from cross-border deficit markets they would most naturally serve. National borders currently separate surplus millet and sorghum producers in southern Mali and Burkina Faso from deficit markets in half a dozen surrounding countries; surplus maize grown in South Africa from deficit markets throughout southern and eastern Africa; breadbasket zones in northern Mozambique and southern Tanzania from intermittently deficit markets in Malawi, Zimbabwe and eastern Zambia; and livestock exporters in Mali, Mauritania, and Niger from coastal markets across West Africa (Haggblade 2013). Despite moves towards regional integration, border trade continues to incur high transactions costs from official red tape, bribes, and poor infrastructure and logistics. For example, the estimated

food price differentials along the Burundi-Rwanda border suggest that border controls enlarge spatial price spreads in food prices by the equivalent of 174 km in market distance (World Bank 2012). These high transaction costs depress farm gate prices, restrict trade flows and reduce farmer incentives to expand food production in Africa's many breadbasket regions.

2. *Price volatility.* In response to domestic production shocks, African governments frequently succumb to political pressure from various interest groups to impose export or import bans, and ad hoc changes in tariffs or even direct state trading operations in response to domestic production shocks (Minot 2010). Ironically, erratic government interventions in the name of price stabilization may instead produce the opposite effect, exacerbating price instability (Minot 2012; Jayne 2012).

Given the pronounced production volatility common under Africa's primarily rainfed agriculture, cross-border trade becomes a valuable tool for stabilizing national food supplies and prices (World Bank 2012). Open borders tend to reduce price volatility because export prices set a price floor and import prices set a ceiling on domestic food prices. Recent evidence from Zambia, for example, suggests that open borders cut maize price swings roughly in half (in both drought years and bumper harvest years) compared to a closed border policy regime (Dorosh et al. 2009).

3. *Input availability and cost.* Border restrictions and incompatible country regulations lead to fragmented, small national input markets thus preventing private input companies from operating at an efficient scale. This proves especially true for seed companies that face a myriad of regulations on varietal release and often outright bans on moving commercial seed across borders. Efforts to harmonize regulations within a region and automatically provide reciprocal varietal registration have been discussed for decades though even after agreement at the regional level, countries have often dragged their feet on implementation. Regional trade can also help to lower fertilizer costs by reducing transaction costs and enabling economies of scale in procurement and distribution. Economies attainable from bulk fertilizer imports, regional logistics platforms and intra-Africa regional trade could reduce farm-level prices of imported fertilizer on the order of 30 percent particularly in small, land-locked countries (Gregory and Bumb 2006; Morris et al. 2007).

Investment in public goods to drive productivity growth

Considerable evidence supports the key role of public investment in increasing agricultural productivity and reducing poverty (Fan 2008). Studies in several countries indicate that the highest payoff is to investment in R&D (sometimes including extension), generally followed by investment in education and rural roads (although categories and coverage vary by study) (FAO 2012b). FAO (2012b) notes that African public spending on agriculture is lower than any other region relative to its share in GDP. Some of the needed increase in investment could be provided by foreign assistance but most would have to be from national resources.

1. *Rural infrastructure.* Public investments in rural roads, in power and in communications infrastructure all strongly shape opportunities open to smallholder farmers. Investment in roads, especially rural roads has been consistently documented as an important determinant of agricultural productivity (Fan 2008). In Africa, where transport costs are high, an estimated 75 percent of farmers are located more than four hours from the nearest market by motorized transport as compared to 45 percent in Asia (World Bank 2007a). One study indicates that rural road transport costs three to five times more per km than main road transport, so that 45 percent of transport costs are incurred in the first 28 percent of the distance transported from the farm (Freund and Rocha 2011). Decisions on the siting of key road system improvements play a key role in enabling smallholder access to inputs and markets.
2. *Research and development.* Research and development of new, more productive small farmer technologies largely depends on public funding, because of well-known market failures that do not allow private companies to appropriate the benefits from investment in R&D, especially in the early stages of development. Vegetatively propagated crops such as cassava and yams, though critical to smallholder food security in Africa, depend exclusively on publically financed research. The experience of the Brazilian Agricultural Research Corporation (EMBRAPA) in opening of the Cerrado to crop production has demonstrated the power of public R&D in revolutionizing tropical agriculture.

Public research systems in Africa are fragmented and subject to low and unstable funding. Development and adaptation of technologies is further complicated by the large number of food staples in the region (at least eight), the heterogeneity of African rainfed systems, and the small market size for new technologies in most African countries. Investment in public R&D programs increased rapidly from the 1970s but then stagnated in the 1990s. Spending on R&D fell in about half of the countries of sub-Saharan Africa during the 1990s and in 13 of 29 countries from 2001-08 (Beintema and Stads 2011). The small size of many African countries leads to dispersion of the meager resources available, while fiscal crises and dependence on donors result in highly unstable funding. With low salaries and poor working conditions, human resources have been depleted and scientific staff are aging. Even relatively advanced countries such as Ghana are attempting to manage research systems with virtually no operating budget (Ragasa and Essegbey 2011).

Improving R&D capacity is thus an imperative across the region, not only the funding but the incentives for building scientific excellence and applying it to solve high priority problems. Closer partnership with the private sector including farmer organizations, offers one opportunity for ensuring that research is demand driven, especially for emerging commercial agriculture. Given the small size of most countries, there is little choice but to move to closer integration of research programs at the regional level and with the CGIAR system.

Access to land

Recent media attention on “land grabs” has highlighted the poor governance of Africa’s large and underutilized land resources as well as the lack of secure land tenure for smallholders. Dynamic smallholder farmers require access to larger, consolidated land holdings as they grow over time. In principle, this should be possible given that Africa currently houses the largest tracts of uncultivated farmland in the world. Ironically, in spite of uncultivated land, Africa’s land tenure system has resulted in growing land pressure in some areas at the same time that governments are allocating large blocks of new land to investors. An equity problem arises when large institutional investors can gain access to commercial sized farm holdings, while domestic smallholders cannot. Negative welfare impacts and often conflict result when investors usurp the rights of existing cultivators.

However, it is time to move the debate away from land grabs and focus on improving smallholder rights and access to land, given evidence that even in relatively land-abundant countries, farm size is declining (Jayne et al. 2012). Although land tenure policies vary across the region, there is general agreement that land markets function poorly in allocating land. For the longer term, governments urgently require a decentralized, transparent, and participatory process to formalize community and individual rights to increase tenure security and reduce the transaction costs of acquiring land. Recent experience with rapid and large-scale recording of land rights in Ethiopia and Rwanda, provide the base for a much larger effort (e.g., Deininger et al. 2008).

Development of new farmland in low population density areas will require public infrastructure investments in roads, power and telecommunications as well as transparent procedures for acquiring and allocating land. Farm blocks with mixed farm sizes offer one model for enabling large farms to serve as anchor tenants while small- and medium-sized plots allow successful commercial smallholders to acquire more land, while simultaneously gaining access to improved infrastructure services, input supplies and output markets. In return, investors must give greater attention to the rights of local users and the potential impacts of their investments on local livelihoods.

Access to financial services

Because annual crops result in a single lump-sum cash payment, successful smallholder farming requires careful budgeting, highly disciplined cash management and savings (Chapoto et al. 2013). Given the many risks involved in rainfed agriculture, smallholders who prosper over the long term are typically those who are able to build up a financial savings cushion or fungible livestock assets that enable them to rebound and rebuild in the aftermath of a major drought, disease outbreak or price collapse. Public investments and interventions that support both forms of savings, therefore, help to improve prospects for successful smallholder commercialization. For example, control of contagious livestock diseases is a public good that helps farmers to protect their livestock assets. Secure forms of financial savings are also important. The recent emergence of mobile money transfer and savings schemes in many parts of Africa offer potentially important vehicles for farmers to secure the financial savings necessary to their commercial survival.

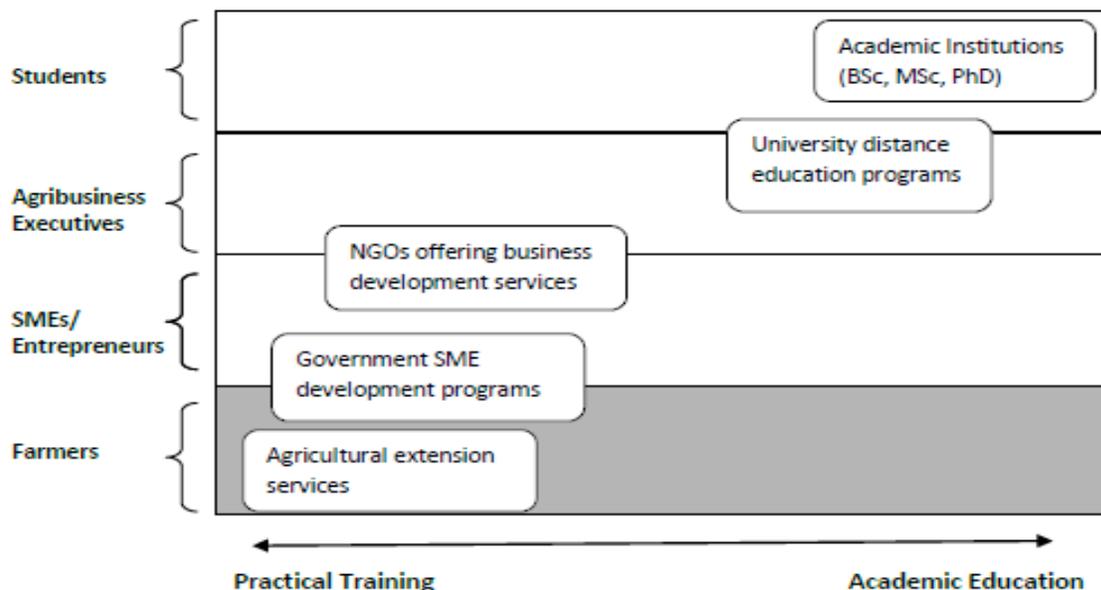
For input financing and fixed capital investments, the demise of state sponsored credit programs and state banks has not solved the farmers' perennial problem of access to finance. Private banks currently lend little to the sector, especially to smallholders where unit costs of loan transactions can be high, but also to larger enterprises where banks are unfamiliar with the sector and concerned by high risks. Innovations such as e-banking technologies and flexible rules on collateral are slowly expanding lending to the sector. Innovative ways of providing collateral, such as the use of movable assets, warehouse receipts, partial credit guarantees, and equipment leasing, all reduce the risk of agricultural lending (World Bank 2013). Tying lending to insurance products such as index-based weather insurance is also being piloted. Each of these innovations has had some initial successes, but much remains to be done to make them sustainable, implement regulatory frameworks, and scale up. Partial credit guarantees have shown the most success in reaching a range of small and medium enterprises involved in input distribution and agro-processing, that are in turn critical to stimulating smallholder development.

Skills training

Commercial farming and agribusiness today is managerially and technically complex. Managers and decision makers need new skills, mentoring and ongoing access to information to cope with rapidly changing technology, pests, and markets, within an environment of climatic risk and price volatility. Recent reviews have highlighted the skills deficit in the agricultural sector, from the most basic level (70 percent of youth entering farming have not completed primary school) to technical and managerial skills required all along the value chain (Mabaya et al. 2010; World Bank 2013).

A range of different types of training is needed (Figure 3) that will require major transitions in the educational system. Historically, Africa's agricultural universities have trained extension staff and researchers for the public service. In the future, however, the areas of most rapid growth in Africa's food system will occur in input supply and in the post-farm segments of the supply chain – in food processing, packaging, logistics, price risk management and food safety. As a result, most agricultural universities will need to make an institutional double pivot – from public sector to private sector clients and from on-farm technologies to post-farm segments of the food system. This institutional restructuring will require a major shift in laboratory facilities, faculty skill sets and in systems for engaging with private sector employers in the food system (Minde et al. 2012).

Figure 3: Overview of farmer and business training at different levels



Source: Mabaya, et al. 2010.

The demise of public extension systems in sub-Saharan Africa since the 1990s has opened opportunities to experiment with more market-driven advisory services. Many systems are moving to pluralistic approaches with different models often being used within a country depending on the type of farmer and commodity (Davis 2008). Although extension is still largely publicly funded, funds increasingly flow through local governments, NGOs and farmer organizations that have a controlling interest in fund allocation. Uganda’s National Agricultural Advisory Services empowers farmers’ organizations by providing them grants that they co-finance to contract pre-certified NGOs and private providers to deliver specific advisory services (Benin et al. 2010). New information and communication technologies also have major potential to fill the information gap. The challenge now is how to scale up successful innovations to fill unmet demands for such services.

Private initiatives are also spreading. Several nongovernmental and private organizations provide entrepreneurial training focusing on building a future generation of entrepreneurs for farming as a business and for related businesses in the value chain. Market Matters Inc for example, provides a one-week intensive program to small and medium enterprises followed by three months of aftercare (Mabaya et al. 2010). Another successful example is the Songhai Center in Benin, now graduating 300 young people annually through “hands on” practical training involving private partners to help access finance and advisory services to start a farm or related business.

The outgrower and contract farming models discussed above likewise offer clear potential for agribusinesses to mentor emerging commercial smallholders. A recent study of Zambia’s contract cotton farmers has documented how the major ginners provide regular agronomic support to their farmers through cotton schools and the training of specialized service providers. Farmers then transfer these skills to other arenas, making “the cotton schools important

incubators for successful commercial farmers and agribusiness entrepreneurs” (Chapoto et al. 2013).

Conclusion

Given the favorable market outlook at the national, regional and global levels, there has never been a better window of opportunity for African agriculture to realize its potential to meet the demands of food systems in 2030. Indeed, if African countries do not seize this opportunity, the region will become increasingly dependent on imports to feed its burgeoning cities, despite its natural advantages in land, water, and climate for food production.

While market-oriented smallholders must be the basis for accelerating agricultural growth for most commodities in the region, the debate needs to go beyond a simple smallholder-largeholder dichotomy. We must recognize that private investment in the sector is critical to success—more so than at the equivalent stage in the Asian green revolution. The challenge is how to ensure not only faster agricultural growth but also more equitable growth. Fortunately, this survey suggests that a variety of business models being employed in the region offer much promise for achieving faster and more inclusive growth.

Indeed, this review has highlighted many instances where linking small farms and large firms benefits both groups. Contract farming and outgrower systems, for example, depend fundamentally on mutual interest between smallholders and large agribusiness firms. These arrangements emerge in circumstances where smallholders enjoy competitive advantages in farm production but where marketing or large-scale processing requires institutional agribusiness investment. In these settings, both farmers and agribusiness processors benefit from raising on-farm productivity and throughput in the processing plants, which simultaneously raise returns to farming and processing. Public policy can help to harmonize interests and expand opportunities for collaboration between small farms and large firms in several important ways: through clear regulatory systems, good systems of contract enforcement, and transparent, equitable land allocation systems.

Although growth must be private sector led, the state retains a critical role. Policy reform in the region remains unfinished business, and a number of cross-cutting policies influence performance across the board, for both smallholders and agribusinesses. Continued and sustained efforts to address these issues as well as deepen investment in core public goods will be needed. The state also has a role in avoiding public “bads” that undermine market incentives through arbitrary market interventions, or that favor larger enterprises over family farms and firms, such as provision of cheap land to investors at well below its potential market value.

Looking forward, both large firms and small farms have a role to play in Africa’s agricultural development. This paper has outlined areas of common interest as well as an array of business models that will enable more rapid, inclusive agricultural growth going forward. Our review provides optimism that in the new investment climate agricultural growth will accelerate, and with appropriate policies in place, a vibrant smallholder sector will be able to tap into these opportunities to ensure equity outcomes.

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Core literature on African Food Systems to 2030: Toward inclusive business models

Chapoto, A., Haggblade, S., Hichaambwa, M., Kabwe, S., Longabaugh, S., Sitko, N. and Tschirley, D. 2013. Institutional models for accelerating agricultural commercialization: Evidence from maize, cotton and horticulture in Zambia, 1965 to 2012. In *Agricultural transformation in a global history perspective*, Ellen Hillbom and Patrick Svensson, eds, Routledge Press.

This paper traces the trajectories of successful commercial smallholders operating under differing sets of market institutions in Zambia. It focuses on maize, cotton and horticulture, three widely marketed crops with strikingly different market institutions. Using a mix of quantitative and qualitative methods, the analysis identifies personal characteristics and institutional factors that enable smallholder transitions to high-productivity commercial agriculture. The analysis illustrates a variety of institutional arrangements for successful commercialization.

Christiaensen, L., Demery, L., and J. Kuhl. 2011. The (evolving) role of agriculture in poverty reduction—An empirical perspective. *Journal of Development Economics* 96(2): 239-254.

This paper uses cross-country econometric analysis to provide strong evidence that agriculture is significantly more effective in reducing poverty among the poorest of the poor. It is also up to 3.2 times better at reducing \$1-day headcount poverty in low-income and resource rich countries (including those in sub-Saharan Africa), at least when societies are not fundamentally unequal. These results are driven by the much larger participation of poorer households in growth from agriculture and the lower poverty reducing effect of non-agriculture in the presence of extractive industries.

Deininger, K. and D. Byerlee. 2012. The rise of large farms in land abundant countries: Do they have a future? *World Development* 40: 701-714.

Resurgent interest in agriculture raises issues about agrarian structure and the balance between large and small farms that have thus far been addressed mainly from a smallholder angle. The paper identifies economic and policy factors that contributed to episodes of large farm growth (based on corporate as opposed to family farm models), their impact, and ways in which these may have changed recently. An analysis of recent land demand from large investors suggests that greater clarity in the definition of property rights, attention to employment effects and technical viability, and mechanisms to re-allocate land from unsuccessful ventures is critical.

Poulton, C., Dorward, A., and J. Kydd. 2010. The future of small farms: New directions for services, institutions, and intermediation. *World Development* 38(10): 1413-1428.

Efficient pre- and post-harvest services are essential if small farms in high potential areas are to intensify production, contribute to economic growth, and reduce poverty. Difficulties that smallholders face in accessing services are reviewed, showing how incentives for commercial delivery of services to smallholders differ between staple food, traditional cash crop, and high

value product supply chains. The major challenge in service delivery to smallholders in much of Africa concerns coordination of service development and delivery. Different forms of intermediary institutions for achieving such coordination are examined.

Smale, M, Byerlee, D. and T. Jayne. (forthcoming). The elusive quest for maize technical change in sub-Saharan Africa. *Journal of Development Studies*.

Maize remains crucial for food security in sub-Saharan Africa. However, despite episodes of success, the evidence compiled here suggests that very little progress has been made toward achieving this potential in recent years. Over the long term, large investments and sustained political commitment are needed to ensure strong plant breeding and seed systems to serve smallholders, predicated on improved crop management practices to protect soils and cope with unreliable rainfall, and access to appropriate labor-saving technologies. Even more important than technology is the need for more innovative extension and advisory systems, better financial services, perhaps including new forms of insurance, efficient input and output markets, and consistent long run commitment by governments to engage the private sector. Both technological and institutional innovations are needed to adapt to local environmental and social conditions.

Swinnen, Johan F. M. 2007. *Global supply chains, standards and the poor: How the globalization of food systems and standards affects rural development and poverty*. Wallingford, UK: CABI.

Using field-based research from Asia, Africa, Europe and Latin America this book reviews the recent restructuring of the global agri-food industry and the dramatic rise of global retail chains in developing and transition countries. It focuses on the private standards and requirements imposed by multinational companies investing in these countries and the resulting changes to existing supply chains. It also examines the impact of these changes on local producers, particularly poor farmers, and considers the long-term policy implications in terms of growth and poverty.

Vermeulen, S. and L. Cotula. 2010. *Making the most of agricultural investment: A survey of business models that provide opportunities for smallholders*. London: International Institute for the Environment and Development.

This book examines a range of business models that can be used to structure agricultural investments in lower- and middle-income countries, and that provide an alternative to large-scale land acquisitions. Business models are considered as more inclusive if they involve close working partnerships with local landholders and operators, and if they share value among the partners. Some models involve large-scale farming but with closer involvement of local landholders. Others bring smallholder farmers into the value chain. Many are thoroughly tried and tested, while others are confined to narrow sectors and could be applied more widely, or else are still isolated, interesting pilots.

World Bank. 2013. *Africa growing: Realizing the potential for agribusiness*. Washington, DC: World Bank.

With global and regional food and agricultural markets growing at unprecedented rates, this new report synthesizes a large body of work on agriculture and agribusiness in Africa to provide an overview of how to unlock and transform agriculture for development across Africa. It builds on a diagnosis of specific value chains (rice, maize, dairy, cocoa and green bean exports), and shows how a dynamic agribusiness sector can contribute to growth. Over 170 agribusiness investments by the Commonwealth Development Corporation (CDC) in Africa and Southeast Asia were analyzed to gain a better perspective about the elements that determine success or failure of businesses. The report also synthesizes private sector perspectives gained through interviews with 23 leading agribusiness investors and industry stakeholders, and shows the potential private sector dynamism that could be unleashed if some of the barriers to investment in Africa—poor infrastructure, fragmented markets, poorly functioning input markets, difficulties accessing land, water and finance, and inadequate skills and technology—are removed.