



Why African rural development strategies must depend on small farms



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ABSTRACT

Improving the productivity of smallholder farms in Sub-Saharan Africa offers the best chance to reduce poverty among this generation of rural poor by building on the few resources farming households already own. It is also the best and shortest path to meet rising food needs. Using examples from farmers' maize and rice fields, comparisons with Asia, and an extensive literature review, we explain why the set of technologies promoted to date have produced localized successes rather than transformational change. We also examine the limitations of alternative policies that are not centered on small farms. We give indicative examples of how resource-management technologies can supplement seed-fertilizer technologies to speed an African Green Revolution.

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1. Introduction

The goal of boosting productivity on smallholder farms is a central pillar in the rural development strategies of most African governments. There are many reasons for the broad support given to African smallholders, but two are most often cited. First, the vast natural resources in the hands of Sub-Saharan African smallholder farmers can be used more productively to feed a growing global population, many of whom will live in Africa. Second, increasing agricultural incomes through improved technologies offers the shortest path to poverty reduction in rural areas, where poverty has been most persistent. In this essay, we argue that, while it is the second argument that is especially compelling for policy, findings ways to boost smallholder productivity in Africa offers the best chance to achieve both objectives.

On average, smallholder farmers in Africa would earn higher incomes working in sectors other than agriculture. And in countries where land and labor productivity are highest, farms are usually larger than they are in Africa. Further, as economies develop, the proportion of workers in agriculture declines and a larger share of the population lives in cities. So, why should rural development strategies in Sub-Saharan Africa remain focused on smallholder farms?

The answer has to do with the slow pace of this archetypal economic transformation. For many reasons, the reallocation of labor from agriculture to other sectors is constrained and occurs over generations, even when income gaps are large and sustained. The pace of farm restructuring is slower still, so farms tend to remain small even as agriculture's share of employment declines. Consequently, policies designed to reduce poverty for this generation of rural poor must work largely within the constraints of small farms. In the case of Asia's Green Revolution, new technologies were developed by scientific institutions and quickly adopted by farmers that did just that. What's more, productivity growth rates were sustained while farms remained small. Ultimately, Asia's success influenced African policies, where most strategies to boost productivity have three common elements: a focus on smallholders; an emphasis on staple crops, mostly maize and rice, and a reliance on improved technologies, most often based on fertilizer-responsive high-yielding seeds.

Nevertheless, while the need to drive rural development through improved smallholder productivity is clear, the task is harder in Sub-Saharan Africa than it was in Asia. Specifically, the agroclimatic and market conditions that predicate the success of technologies are more varied in Africa than in Asia at the start of its Green Revolution. Consequently, the portfolio of technologies needed to launch a transformational African Green Revolution is larger and the task of identifying what works best locally is more difficult. It also means that the seed-fertilizer-focused technologies that work well in Asia, though important, are unlikely to solve all

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of the key constraints faced by African farmers. This, in turn, holds back sector-wide productivity growth and explains why successes to date have been local rather than sectoral. Part of the solution is to design and deploy a larger set of targeted technologies with local constraints in mind. Drawing on a set of farm studies originally published in [Otsuka and Larson \(2016\)](#), we document how resource-management based technologies can supplement conventional high-yielding seed-fertilizer technologies to improve smallholder productivity in Sub-Saharan Africa.

2. Green Revolutions as a path out of rural poverty

There are several potential pathways out of poverty for rural households, although none is easy. Family members from poor households often leave rural areas, migrating to cities or to other countries to earn incomes outside of agriculture. Still, studies suggest that potential migrants are often hampered by mismatched skills and anchored by illiquid land assets and place-specific social capital, which provide informal forms of insurance otherwise unavailable ([Larson et al., 2004](#)). Additionally, the benefits of moving from agriculture decline with age. Consequently, the window for sectoral migration is brief and constrained. As a result, the pace of structural transformation is exceedingly slow and takes generations to achieve ([Larson and Mundlak, 1997](#); [Gardner, 2000](#); [Butzer et al., 2003](#)). In many African countries, it is a process that is far from complete. According to the Food, Agriculture Organization ([FAOSTAT, 2015](#)), Sub-Saharan Africa's population is expected to remain primarily rural through 2033, and the absolute number of people living in rural areas will continue to climb through 2050. Nearly 60 percent of Sub-Saharan Africa's jobs were in agriculture in 2010, and agriculture is expected to add more jobs through 2020 than the formal service and industry sectors ([Fox et al., 2013](#)).¹ Consequently, a large portion of the rural poor will remain in agriculture for the foreseeable future and any effective set of policies will have to reach them there.

Rural nonfarm income activities offer another path out of poverty, and can be key to achieving food security ([Otsuka and Yamano, 2006](#); [Dethier and Effenberger, 2012](#)). However, agriculture is often the engine that drives local non-farm income opportunities, and when it does not, proximity to urban areas is important ([Dorosh and Thurlow, 2014](#)). Conversely, a large number of remote farmers in Sub-Saharan Africa have no access to non-farm income at all ([Frelat et al., 2016](#)). In addition, there is evidence that better off farmers also have better nonfarm opportunities, which weakens the links between nonfarm income gains and poverty reduction ([Bezu et al., 2012](#); [Haggblade et al., 2007, 2010](#); [Djurfeldt and Djurfeldt, 2013](#)).

In contrast, technological transformations in agriculture can occur in a single generation. During Asia's Green Revolution, new seeds and new farming practices spread quickly, especially among rice and wheat farmers ([David and Otsuka, 1994](#); [Evenson and Gollin, 2003a](#)). As a result, rural incomes grew directly from on-farm productivity gains. Businesses catering to agriculture and farming households benefited as well, spurring growth in nonfarm employment. Rural families were able to invest in the health and education of their children, helping them to prepare for jobs in other sectors. In short, Asia's Green Revolution transformed rural economies and engendered a type of economic growth that benefited the poor ([Rosegrant and Hazell, 2000](#); [Hayami and Kikuchi, 2000](#); [Hazell, 2009](#)).

¹ [Fox et al. \(2013\)](#) estimate that agriculture will account for 37 percent of new jobs in SSA between 2010 and 2020; household enterprises will generate 38 percent of new jobs, while the formal service and industrial sectors will account for 21 percent and 4 percent.

Furthermore, the dynamics of Asia's success are relevant globally. A wide-range of country and cross-country studies suggest that productivity gains in agriculture is a powerful catalyst for poverty reduction and economic growth ([de Janvry and Sadoulet, 2010](#); [Irz et al., 2001](#); [Diao et al., 2010](#); [Bravo-Ortega and Lederman, 2009](#); [Christiaensen et al., 2011](#); [Anríquez and López, 2007](#); [Anderson et al., 2010](#)). Conversely, past efforts to promote other sectors at the expense of agriculture slowed growth and lowered incomes instead ([Mundlak et al., 1989](#); [Coeymans and Mundlak, 1992](#); [Bautista and Valdés, 1993](#)). It is worth pointing out that the results are consistent across a wide range of farm structures that include the small farms of Africa and Asia, and the larger farms of Latin America.

In most places, policies that distort domestic agricultural prices to favor other sectors have waned; however, this is less true in Sub-Saharan Africa than in other developing regions ([Anderson, 2009](#)). Using panel data, [Anderson and Brückner \(2012\)](#) show that a continuation of anti-agricultural policy bias continues to slow overall economic growth in the region.²

3. Scale, technology adoption, and global food supplies: past lessons and future prospects

Despite the many changes brought about by Asia's Green Revolution, sector productivity in Asia is still driven by what happens on small farms, and the same is true in Sub-Saharan Africa. In East Asia, South Asia, and Sub-Saharan Africa, 95 percent of the farms are less than 5 ha in size and these farms occupy most of the farmland in these regions ([Lowder, Skoet, and Singh, 2014](#)). Additionally, historical farm census data suggests that the small scale of farming in Asia and Africa persists, even when economic growth in non-agricultural sectors is high. In fact, if there is a noticeable trend, the trend is toward smaller farms ([Table 1](#)).

Still, the small scale of farms in Africa need not stand in the way of technology adoption and productivity gains. Indeed, the breakthroughs that launched Green Revolutions in Asia and Latin America largely centered on seeds, not machines, so the benefits were available to farms of all sizes. Nevertheless, initial adoption rates were highest on Asia's small farms, in part because the technologies worked especially well in places where labor was abundant ([Hossain, 1977](#)). For example, [Evenson \(2003, p. 450\)](#) reports that by 1998, about 82 percent of the area in Asia planted to major crops used improved seeds. In Latin America, where farms are larger, adoption rates were similar for wheat, a significant export crop; however, rates were lower overall, with 62 percent of the land planted to modern varieties by 1998.

Further, there is evidence, mostly from Asia, that an agrarian structure composed mainly of small farms is a better foundation for technology diffusion and overall economic growth ([Lipton, 2009, Chapter 2](#)). For example, [Singh \(1985\)](#) shows that Indian villages with smaller farms and a more equitable distribution of land adopted Green Revolution (staples) and White Revolution (milk) technologies more quickly than otherwise similar villages. [Bardhan and Mookherjee \(2006\)](#) find similar results in West Bengal during the 1980s, and 1990s. At a national level, [Jeon and Kim \(2000\)](#) report production and income gains from Korean land reforms carried out in the 1950s that reduced average farm holding size. Using a cross-country panel, [Vollrath \(2007\)](#) finds that output per hectare improves as land distribution becomes more equitable.

² Conversely, the authors found no evidence that distorting prices to favor agriculture speeds growth.

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