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On the Structural Transformation of Rural Africa

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Abstract

From 2000 to 2014, per capita gross domestic product in Sub-Saharan Africa increased by almost 35 percent in real terms, doubling in some countries. Such progress happened while agricultural productivity growth remained low in the aggregate, despite some bright spots, and poverty reduction was steady but discouragingly slow. This paper argues that ending extreme poverty will require structural change in agriculture, and in rural African economies more broadly. Drawing on a range of recent research, the paper outlines broad priority areas for policy actions to accelerate productivity and initiate structural change in the agriculture sector and the rural nonfarm economy.

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On the Structural Transformation of Rural Africa

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1 Introduction

Virtually every one of today's high income economies enjoyed sustained agricultural productivity growth coupled with transformation of the rural non-farm economy that jointly sparked rapid industrialization and inclusive economic growth. Indeed, the Nobel Laureate W. Arthur Lewis famously wrote: "industrial and agrarian revolutions always go together, and … economies in which agriculture is stagnant do not show industrial development" (Lewis 1954, p. 433). Until most recently, the economies of Sub-Saharan Africa (SSA) have also been enjoying robust economic growth (4.5 percent growth in gross domestic product (GDP) per capita per year during 1995-2013), according to World Bank data,[1] and the region shows early signs of agricultural productivity growth and structural transformation.

But much remains to be done. Despite notable progress—the share of people in SSA living on less than $1.90 a day (in 2011 international purchasing power parity PPP) declined from 54 percent in 1990 to 41 percent in 2013)—the number of extreme poor still increased, by more than 100 million (from 276 million to 389 million).[2] Extreme poverty remains high, with the $1.90 a day headcount poverty rates in SSA today twice as high as in South Asia, and more than ten times higher than in East Asia.[3] By 2030, most of the world's extreme poor (four out of five) are predicted to be concentrated in Africa (World Bank, 2013).

This is partly driven by continuing high population growth (2.7 percent per year during 1990-2013). But the challenge of persistent extreme poverty that has plagued Africa for a generation is also closely bound up with continuing low agricultural productivity and the nature of the region's structural transformation. Most of the region's poor still find themselves in rural areas—an estimated 82 percent (Beegle et al., 2016)—earning the bulk of their income in agriculture—an estimated 69 percent among rural households in a sample of nine African countries, and even more among the rural poor (Davis, di Giuseppe and Zezza, 2016). The sheer size of these numbers makes what happens in agriculture particularly important for poverty reduction. At one level, real agricultural value added (constant 2010 US$) has been growing annually at 4.1 percent during 1990-2013, but only at 1.4 percent in per capita terms. The areas cultivated with cereals expanded annually by 1.3 percent; cereal yields by 1.6 percent. Not only is this productivity growth less than what has been observed, for example, in Asia during the Green Revolution, it started from a very low base and remains low. Cereal yields in SSA (about 1.5 ton/ha) are today still only about half those in South Asia (3.1 ton/ha in 2014), and about a quarter those in China (6.0 ton/ha).

There has also been structural transformation. Agriculture's share in GDP declined from 23 percent in 1995 to 17 percent in 2013. The share of agricultural employment likewise fell during the 2000s, by an estimated 10 percentage points.[4] Yet Africa's structural transformation has been towards (non-tradable) services, not tradable manufacturing (Rodrik, 2016). This partly links with Africa's commodity boom during the 2000s, which fueled economic growth in many countries as well as urbanization, in particular the emergence of consumption cities, characterized by higher shares of imports (including of food) and employment in non-tradable services, as opposed to tradable manufacturing or services (Gollin, Jedwab and Vollrath 2016). While inconsequential regarding the level of urbanization (and also growth and aggregate income in the short run), such resource driven structural transformation, urbanization and

[1] This and all subsequent 'World Bank data' come from the World Development Indicators data (http://wdi.worldbank.org/), unless otherwise indicated.

[2] Careful scrutiny of the data suggests that the number may be somewhat lower, but even under the most optimistic data scenario, more than 330 million people were estimated to be extreme poor in 2012 (Beegle et al., 2016).

[3] http://iresearch.worldbank.org/PovcalNet/home.aspx (read on 15 November 2016).

[4] Calculations based on the I2D2 database using 12 African countries with at least two points of sectoral employment data during 1995-2013 separated by at least 5 years (excluding Nigeria) suggest a population weighted 10-year decline of about 10 percentage points. The numbers are similar in magnitude to those reported by MacMillan and Harttgen (2014) using the Demographic and Health Surveys and de Vries et al. (2014). For the 14 and 9 African countries studied, they also report about a 1 percentage point decline in the share of agricultural employment per year over the past 10 (2000-2005 and 2006-2012) and 20 years (1990-2010), respectively.

growth have historically also been associated with greater slum formation, higher urban poverty, larger rural-urban income gaps, and more inequality than transformations towards tradable manufacturing and services. With much of the growth literature suggesting that convergence is faster in industry than in (non-tradable) services (Lucas, 2009; Rodrik 2013), and commodity prices collapsing since 2012 following the end of the commodity supercycle, this does not bode well for sustaining growth and poverty reduction. After slowing to 3 percent in 2015, Africa's growth is projected to fall to 1.6 percent in 2016, the lowest level in two decades (World Bank, 2016).

Different schools of thought have emphasized different drivers of successful structural transformation, urbanization, growth and poverty reduction. Rural push theories highlight the critical role of raising labor productivity in agriculture to productively release labor for off-farm activities. Urban pull theories underscore the critical role of industrial technology in urban areas to put the large amounts of underemployed rural labor to productive use (Jedwab and Vollrath, 2015). What comes first (rural push or urban pull) remains difficult to disentangle. Development and poverty reduction have often proceeded fastest when agricultural and industrial revolutions go together (Lewis 1954). Although some SSA countries have recently shown signs of such coupled growth (e.g. Ethiopia, Rwanda), this has not (yet) happened at the scale or across the number of countries needed to make a major dent in Africa's poverty.

This paper describes the key undercurrents necessary for structural transformation to occur, with a focus on the role of agriculture, the current state of agricultural labor productivity growth in rural SSA, and the structural impediments currently slowing the rate of progress. The aim is to update contemporary African policy makers as they attempt to stimulate agricultural and rural transformation to foster sustained and inclusive economic growth that will accelerate poverty reduction in the region. Section 2 provides stylized facts on the path of structural transformation in agriculture with a brief review of the current state in SSA. Deep-seated factors impeding structural change in Africa's agriculture and food systems are discussed in section 3, after which section 4 turns to nascent positive developments that merit monitoring. Section 5 outlines key policy priority areas, while the last section concludes.

2 Structural transformation in SSA agriculture

2.1 Essentials of structural transformation of agricultural and rural economies

Structural transformation describes the process by which low-income societies, in which agriculture absorbs most labor and generates most economic output, become high-income societies characterized by a relatively smaller but more productive agricultural sector. The primary macro-level descriptor of economic development has always been a steady decline of agriculture's share of both employment and GDP, a pattern strongly associated with income growth, urbanization, poverty reduction, and a demographic transition from high birth and death rates common in backward rural areas to lower ones associated with better health standards. The final outcome of the structural transformation is an economy in which well-functioning factor (e.g., financial and labor) and output (e.g., food) markets equalize the capital and labor productivity between agriculture and non-farm industry and services, leading to inclusive economic growth.

The historical record and macro evidence is very clear on the key role that agriculture plays in stimulating the non-agricultural economy (Timmer 2002, 2009, Syrquin 2006, Barrett, Carter and Timmer, 2010), even in transitioned societies (Chen and Liao, 2015). The importance of the bidirectional linkages between rural agricultural and urban industrial economies has been a longstanding theme of the structural transformation literature, dating at least from Lewis (1954) and Johnston and Mellor (1961). Most experts have seen productivity growth, perhaps especially on small farms, as the key ingredient to rapid poverty reduction and a healthy structural transformation, although that view has been contested recently in the African case (Collier and Dercon 2014, Dercon and Gollin 2014).

In the early stages of structural transformation there typically exists a substantial gap between the share of the labor force employed in agriculture and the share of GDP generated by that workforce. In SSA, agriculture's share of GDP has declined to 17 percent in 2013, according to World Bank data. Meanwhile, agriculture still occupied more than half (52%) of the region's economically active workforce in 2013, according to FAO data.[5] This suggests substantial differences in annual average labor productivity among sectors within SSA. Further analysis (see below) indicates that this is mainly because of larger underemployment within agriculture and rural areas, rather than intrinsically low average or marginal productivity of agriculture. It also signals the existence of barriers to more efficient allocation of factors of production.

Once agricultural productivity growth yields agricultural surpluses and rural incomes rise, intersectoral linkages typically enhance agriculture's contribution to economic growth through factor markets. Rising agricultural labor productivity and the relative decline in food spending as incomes rise (i.e. relative to nonfood spending, even though food expenditures increase in absolute terms)[6] holds down growth in food prices and agricultural incomes, while the demand for non-farm goods and thus off-farm labor increases. Given intersectoral competition for factors of production, this releases labor and capital from the rural farm sector. With average output per person (not necessarily per hour worked) typically lower in the rural farm sector than in the rural non-farm and urban sectors, the intersectoral reallocation of labor further adds to growth and poverty reduction, largely because labor approaches full employment. Identifying and addressing factor market imperfections to facilitate such movement is therefore equally central to the task of stimulating agricultural and structural transformation for the low-income rural economies of SSA. If financial and labor markets worked perfectly, there would be few productivity gains from intersectoral factor migration.

After robust agricultural growth has been established and sustained for some period and the non-agricultural sector has become significant, economies move into an integration phase in which growing agricultural surpluses accelerate growth in the nonagricultural sectors by further mobilizing labor, savings, and tax revenues. The shift in agricultural output from staples towards protein rich foods (meat, dairy), fruits and vegetables[7] and the expansion of agribusiness (storage, transport, processing, wholesale and retail of food), the latter recorded as nonagriculture in the national accounts, are part and parcel of this process (Tschirley et al 2015, Anriquez, 2016). The Asian experience further suggests that poverty reduction is fastest when the agricultural transformation - from staples to non-staples - complements the structural transformation - from agriculture to industry (Huang, 2016). Continued agricultural development depends on increasing integration into the rest of the economy through improved infrastructure and the development of competitive markets.

Obviously, the role of agriculture in an economy's structural transformation described above heavily depends on the extent of economic integration within the domestic economy and with global markets. With full integration, food imports can in principle enable an economy to skip some of the above stages by redirecting labor directly from agriculture into industry, relying on manufactured export earnings to finance food imports (Dercon 2009, Dercon and Gollin 2014). But that trade-based approach has only worked for a very limited number of small developing countries – such as Hong Kong SAR, China, or Singapore – with reliable ocean port access and thus very low-cost connectivity to global markets. Most SSA countries have large populations distant from ocean ports and therefore must rely on domestic production for the overwhelming majority of their food supply for the foreseeable future. Indeed, during 1980-2009, the percentage of SSA agricultural output consumed within the country in which it was produced never fell below 80 percent, and was typically above 90 percent and increasing, on average, over the period, especially among land-locked countries (Barrett and Upton 2013). Also, given the low

[5] This and all subsequent 'FAO data' come from FAOStat (http://faostat.fao.org/), unless otherwise indicated.
[6] This phenomenon is also known as Engel's Law.
[7] The corresponding increase in consumers' dietary diversity as incomes grow is commonly known as Bennett's Law.

manufacturing starting base, an implausibly high rate of manufacturing growth would be needed to absorb and productively employ Africa's incoming youth bulge (Filmer and Fox, 2013).

The structural transformation perspective on the evolution of rural economies also sheds important light on the role of rural livelihoods diversification. Diversification is too often thought of as just a risk mitigation strategy, whereby farmers trade off expected returns for stability in income or consumption, instead of as an avenue for achieving increased returns through strategic complementarities. Both within-farm diversification – crop rotations and intercropping strategies for conserving and stabilizing soil fertility, for example – and farm-nonfarm diversification – using off-farm earnings to obviate liquidity constraints to on-farm investment – can help accelerate productivity growth and equalize returns to labor across sectors. The rural non-farm sector thus provides a crucial bridge between commodity-based agriculture and livelihoods earned in the modern industrial and service sectors in urban centers (Haggblade, Hazell, and Reardon 2007).

Recent evidence further suggests that labor movements out of agriculture into the rural non-farm economy and secondary towns are especially effective in reducing poverty, much more than movements into big cities. So, it is not just the transition out of agriculture which is associated with poverty reduction, but its effectiveness in reducing poverty also depends on where the off-farm jobs become available (Christiaensen, DeWeerdt and Todo 2013, Dorosh and Thurlow 2014, Christiaensen and Kanbur 2016). This complements the observation that agricultural growth has a more powerful poverty reducing effect than does non-agricultural growth (Minten and Barrett 2008; de Janvry and Sadoulet 2009; Christiaensen, Demery and Kuhl 2011).

In addition, access to high-return non-farm opportunities is strongly associated with households' initial holdings of human and other forms of capital and access to financial services. So, to avoid poverty traps, an initial impetus to productive diversification is needed (Barrett, Bezuneh and Aboud 2001; Barrett, Reardon and Webb 2001; Haggblade, Hazell, and Reardon 2007; Marenya and Barrett 2007; Bezu, Barrett and Holden 2012; Stephens *et al.* 2012).

2.2 Current status of the structural transformation of African agriculture

The Comprehensive Africa Agricultural Development Programme (CAADP), established by the Africa Union assembly in 2003, recognizes that a structural transformation of African agriculture is central to accelerating Africa's growth and poverty reduction. African governments agreed through CAADP to increase public investment in agriculture to a minimum of 10 percent of their budgets. Uneven compliance with this pledge notwithstanding, this renewed commitment has sparked complementary efforts in cooperation with international donors, nonprofit organizations, and research institutions. A concerted effort is required because SSA remains the world region with the lowest agricultural labor productivity and the largest share of its workforce engaged in agriculture.

Tracking progress on labor productivity growth as it relates to structural transformation is a challenge because total labor productivity growth represents an aggregate of (i) the increase of labor productivity within existing economic activities via technological change, capital accumulation, or shifts in the terms or trade, as well as (ii) the movement of labor across sectors from low- to high-productivity activities. While the former have processes often equated with agriculture and the latter with nonagriculture, this is inaccurate and was in fact not the case in the original writings of Lewis (1954) who identified the low and high productive sectors with informal and formal activities. The distinction is important because there are informal and formal ways of production in both agriculture and nonagriculture. From that perspective, increasing labor productivity might be as much about increasing productivity within sectors as it is about reallocating labor across sectors.

Moreover, the mere existence of productivity differences does not necessarily trigger labor reallocation. Using macro data, McMillan and Harttgen (2014, Table 5) find that for 1995-2009 reallocation of labor from agriculture to other sectors accounted, on average, for about 40 percent of growth in overall labor productivity across the 16 African countries studied (McMillan and Harttgen 2014), though with large heterogeneity across countries. This largely reflects a move to (low

productivity,[8] nontradable) services in urban areas, consistent with the emergence of consumption cities following Africa's resource boom (Gollin, Jedwab, Vollrath, 2016), and premature deindustrialization (Rodrik, 2016). Nonetheless, a glance at the national accounts would suggest that huge gains can still be reaped from an accelerated reallocation of labor out of agriculture. Also using macro data, Gollin, Lagakos, and Waugh (2014b) estimate that non-agricultural labor is 6 times more productive than agricultural labor in Africa, relative to 4.5 times in other developing countries, 3.4 times in middle income countries, and 2.2 in high income countries.

Yet measuring the potential gains from intersectoral labor reallocation is wrought with measurement challenges, and the national accounts and macro data routinely overstate the prospective gains from leaving agriculture. When adjusting their macro estimates for sectoral differences in human capital and hours worked, the agricultural labor productivity gap declines by half, to 3.3 for SSA and 2.2 for developing countries (Gollin, Lagakos and Waugh, 2014b). Also correcting for differences in human capital, but using micro income data and indirect proxies for differences in sectoral time use shares instead, Vollrath (2013) finds that the misallocation of labor effort between sectors explains only 12 percent of cross-country income variation, compared to 30 percent when using unadjusted macro data from the national accounts.

Important new work by McCullough (2016) using household income and individual hourly labor input data by sector collected through nationally representative household surveys in four countries under the World Bank-led Living Standards Measurement Study - Integrated Surveys on Agriculture (LSMS-ISA) initiative points in the same direction. Once one accounts for inter-sectoral differences in time worked, which is particularly important due to the seasonal nature of agricultural work as well as the often-diversified income portfolios of rural households, the productivity differentials commonly found in less detailed data sets nearly disappear. The powerful implications are that what is commonly understood as an intersectoral labor productivity gap may be more an employment gap and that the commonly used agricultural productivity gap measures drawn from the national accounts should not be taken as proof of agriculture as an intrinsically less productive sector. The lower-than-expected domestic migration observed in Africa (De Brauw, Mueller and Lee 2014) is consistent with this perspective.

Furthermore, important labor productivity gaps appear *within* sectors. Bringing those operating at the 25th percentile in the net labor productivity distribution to the 75th percentile would increase net agricultural labor productivity 4.5 times in Uganda and 7.8 times in Côte d'Ivoire (Christiaensen and Kaminski 2015, World Bank 2016). Substantial scope for intrasectoral labor productivity gains have been similarly observed within the nonagricultural sectors. Finally, while the drivers of structural change are hard to properly identify econometrically, McMillan and Harttgen (2014) and Gollin Lagakos and Waugh (2014b) both report important correlations with proxies of agricultural productivity.

These findings signal (i) the continued importance of focusing on agricultural productivity growth as a vehicle for ushering in structural transformation – rather than prematurely shifting workers to other sectors – and (ii) the substantial scope for improving labor productivity and employment within sectors. Agricultural transformation based on productivity growth, improved market functioning and growth in the rural non-farm economy, remains essential to achieve the goal of inclusive growth and prosperity in SSA.

3 Structural features of African food systems that impede a structural transformation

Several key structural features of the region heavily condition the available paths for structural transformation and the policies most likely to help stimulate sustainable transformation. First, ***land*** is an emerging problem in SSA even though as a continent it remains relatively land-abundant. Nearly half of the world's uncultivated arable land is in SSA (Deininger and Byerlee 2012), making it the world's primary remaining agricultural frontier. Yet, as much as 90 percent of SSA's unutilized arable land is

[8] While low productive, labor productivity may still be higher than in agriculture. The key question is whether adoption of these activities only entails a one-time productivity shift, or whether they also offer opportunities for further productivity growth.

located in just 9 countries,[9] a fair share of it forested with limited transport infrastructure, and thus not easily accessible, and/or plagued by recurring violence. Africa's rural population lives highly clustered in more accessible areas with high agricultural potential, in both land abundant and land constrained settings, with limited potential for land expansion (Jayne, Chamberlin and Headey 2014). Over time this will increase pressure for a growing group of smallholders to remain commercially viable and practice sustainable intensification, especially given that the median farm size is declining, in both land abundant and land scarce countries, and given that, beyond a more continuous cultivation of land, agricultural intensification (through use of improved seed, fertilizer, agro-chemicals and water control, as well as mechanization) has remained lower than expected so far in light of population pressures and market access conditions (Binswanger and Savastano 2016).

This challenge is compounded by the generally poor and degrading quality of Africa's soils. An estimated two-thirds of African land is already degraded, directly affecting about 65 percent of the population (UNECA 2007), a growing body of empirical evidence links low soil fertility to persistent rural poverty (Barrett and Bevis 2015), and poor soils are also less responsive to inorganic fertilizer (Marenya and Barrett 2009, Tittonell and Giller 2013). It also raises the importance of the distribution of especially fertile land and the insecurity of land rights in a number of countries in southern and eastern Africa as well as the imperfect functioning of Africa's land markets, with the rise of medium and large scale farmers posing additional challenges for smallholder farm expansion (Jayne, Chamberlin and Headey 2014). Together, these constraints limit access to credit, investment in soil fertility and labor mobility (Deininger and Jin 2006; Pender and Fafchamps 2006; Dillon and Voena 2015).

Nonetheless, the best available evidence from SSA still indicates a strong inverse relationship between farm size and crop yields (Barrett, Bellemare and Hou 2010; Carletto, Savastano and Zezza 2013; Larson *et al.* 2014; Bevis and Barrett 2016). While this is not evidence of intrinsic superiority of smaller farms per se—it may well be the endogenous outcome of the various factor market imperfections or behavioral phenomena that generate these patterns[10]--the historical evidence from Asia (Ravallion and Chen, 2007), and more recently also from densely populated African countries such as Ethiopia and Rwanda (World Bank, 2015a,b), shows that increasing smallholder productivity can induce rapid poverty reduction, at least in the initial stages. Studying land rental markets in six African countries, Deininger, Savastano and Xia (2016) also find that, despite significant inefficiencies, land rentals are already occurring, transferring land to land-poor and labor-rich producers. Proper land certification is in some cases also having positive impacts for smallholders, inducing them to maintain soils, make productive investments, and enhance land productivity (Holden *et al.* 2008).

Second, ***water resources*** are sharply limiting in most of the region. The aggregate abundance of water in the equatorial region, from Sierra Leone to Uganda, where countries average between 20 - 100,000 m^3 of renewable freshwater resource per capita per annum, stands in sharp contrast to the 70 percent of SSA countries that receive on average an order of magnitude less (World Bank World Development Indicators). Indeed, FAO data classify 43 percent of the SSA land mass as semi-arid to hyper-arid. Even within the arid states, rain and water resources tend to be concentrated, leaving some subregions particularly arid and hence vulnerable to climate shocks. Climate change poses a serious threat. Western, central and southern Africa may experience a decline in their annual average rainfall by 4 to 5 percent as a direct consequence of climate change (Hoerling et al. 2006). Across SSA an estimated 60 percent of all land is at risk of desertification (Benson et al. 1997).

Improved water and land management can help stem or even reverse those patterns. The most recent household survey data from across the continent show that less than 5 percent of farming households have

[9] Democratic Republic of Congo, Angola, Congo, Zambia, Cameroon, Mozambique, Central African Republic, Gabon, Sudan.

[10] Foster and Rosenzweig (2011) suggest that, in India, once one values labor properly, small farms are typically less, not more productive than farms of five or more acres. Some recent cross-country evidence further suggests that policies meant to limit farm sizes may lead to productivity reducing misallocation of land (Adamopoulus and Restuccia 2014).

any irrigation and less than 2 percent of cultivated land is irrigated (Sheahan and Barrett 2014). Expanding the irrigated frontier is a major untapped source of agricultural potential, especially where it can be done economically using surface water or renewable energy resources to pump groundwater (Burney *et al.* 2009).

Third, ***weak human capital*** in rural areas limits agricultural labor productivity growth. Education and health levels remain low across the continent. SSA suffers by far the world's highest rates of under-five and maternal mortality and youth and adult illiteracy (Beegle et al. 2016). Despite a significant increase in primary school enrollment rates since 2000s, adult literacy rates increased only by 4 percentage points during 1995-2012 (from 54 to 58 percent), with rates especially low in rural areas and West Africa. The continuing high prevalence of early child growth retardation (almost 2 in 5 children under five years old are stunted) further casts a long shadow on the productivity potential of Africa's future labor force. Early childhood growth retardation impairs cognitive development, delays school enrollment and reduces future earnings (Grantham-McGregor *et al.* 2007).[11]

The dearth of educated, healthy farmers challenges uptake of innovations and limits the capacity for internally driven innovation in the agricultural sector. The skilled human resources necessary for an effective agricultural R&D program remain scarce in SSA. For example, where low- and middle-income countries in Asia and Latin America routinely have dozens, if not hundreds, of agricultural researchers per million of population economically engaged in agriculture, the comparable number is less than 10 in 24 of the 33 SSA countries for which data are available (Alene *et al.* 2011). Extension services follow a similar pattern, with only one extension worker per thousand Sub-Saharan African farmers, far less than the 1/200 farmers ratio in developed countries as a whole.[12] Although budgets for agricultural research and extension are slowly increasing in some countries, and there has been increased scientific staffing for food crop improvement in particular countries and crops (Alene *et al.* 2011), the scientific human resource base on which to build remains woefully insufficient.

Current agricultural education and training institutions prove also ill prepared to provide Africa's youth with the skills needed to develop agribusinesses, thereby foregoing important remunerative off-farm employment opportunities along the agricultural value chains (Kabasa, Kirsten and Minde 2015; Tschirley *et al.* 2015). Evidence from India indicates that simple management training can obviate informational barriers and lead to significant productivity gains in non-farm businesses (Bloom et al. 2013).

Fourth, the ***institutional and physical infrastructure*** that underpins SSA food systems is relatively weak and expensive. Across SSA, insufficient transportation and communications infrastructure poses significant problems by impeding smooth market functioning for farmers trying to purchase inputs or sell surpluses as well as for post-harvest processors. Weak market integration commonly renders government macroeconomic and sectoral policies ineffective by impeding market transmission of economic signals related to policy change (Moser *et al.* 2009). Similarly, without good access to distant markets that can absorb excess local supply, adoption of more productive agricultural technologies typically leads to a drop in farmgate product prices, erasing many of the gains from technological change and thereby dampening incentives for farmers to adopt new technologies that can stimulate economic growth. It also raises the costs of inputs, undermining the profitability of input use, as documented among a sizeable number of Nigerian maize smallholders (Liverpool-Tasie *et al.* 2016). Markets also play a fundamental role in managing risk associated with demand and supply shocks; good market integration facilitates adjustment in net export flows across space and time, thereby reducing price variability faced by consumers and producers, as most recently observed in Ethiopia (Hill and Fuje, 2016), while poor market integration leads directly to price volatility.

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[11] One cause is insufficient nutrient intake, which in the case of essential minerals often links back to issues of soil degradation (Barrett and Bevis 2015).

[12] This estimate appears reasonably widely, for example at http://allafrica.com/stories/201112221016.html, but its original source is unclear.

The problem arises from the combination of poor transport infrastructure and high cost transport services. The arid countries with low population density, such as Mauritania and Niger, have the severest dearth of roads, with approximately 1 km of road for each 100 km^2 of area, against the low SSA average of about 20 km. While a few SSA countries have extensive networks of paved roads, only 25 percent of road distance is paved, on average. Poor transport infrastructure poses particular problems for the 17 land-locked African countries that face distances of 200-1500 km from their capital cities to the nearest seaports. All-season rural road access appears a key means of overcoming spatial poverty traps, not least of which by encouraging greater market participation, input use, and agricultural specialization (Stifel and Minten 2008, Calderon 2009, Jacoby and Minten 2009, Gollin and Rogerson 2010). Indeed, transport costs are so considerable in land-locked regions, that global oil price shocks have a greater impact on local maize prices than do global maize price shocks (Dillon and Barrett 2016). Rail systems hold promise. However, World Bank data indicate that the modest total distance of active railway lines actually declined by about 30 percent between 1986 and 2009 (Barrett and Upton 2013).

In addition, crossing borders to reach ports leads to high costs beyond the burden of poor physical infrastructure. Border crossings often entail fees—both official and unofficial—that increase transaction costs and delay deliveries. Non-infrastructure related transaction costs also add a lot to the price of transporting goods within countries. Teravaninthorn and Raballand (2009) report, for example, that Africa's transportation costs along four major transport corridors in four different parts of the continent are no higher than in other developing countries, such as China. Nonetheless, transportation prices are much higher, not only because of informal payments along the roads, but importantly also because of trucking companies' market power. Many African countries restrict entry of new companies, enabling incumbents to earn large profits. When Rwanda—a landlocked country—deregulated its transport sector, transport prices dropped dramatically, almost overnight.

Fifth, African agriculture is especially exposed to ***uninsured risk*** as a result of weak infrastructure, limited water management, and its exceptionally high domestic orientation. Financial markets fail for the rural poor for a host of reasons (Besley 1995). The resulting lack of insurance and credit routinely trap poor agrarian households in low return, lower risk technologies, thereby perpetuating poverty and low productivity (Carter and Barrett 2006; Dercon and Christiaensen 2011; Barrett and Carter 2013). Financial market failures are directly associated with relatively anemic rates of development and uptake of modern agricultural inputs, in particular irrigation and machinery (Sheahan and Barrett 2014).

Finally, ***weak governance and political capture*** remains an important impediment to aggressive agricultural productivity growth. Shimeles, Gurara and Tessema (2015), for example, show how fertilizer import prices across a large section of Africa cannot be explained by actual transport and finance costs, implying that market power fostered by government regulation drives high agricultural input prices, starting at import and continuing through the supply channel. Berhanu and Poulton (2014) show how the largest public agricultural extension program in SSA – run by the Ethiopian government – is implemented with election outcomes in mind, undermining its effectiveness as an agricultural productivity enabler. These demonstrations of the political capture of agricultural input systems that should directly translate into agricultural productivity gains suggest structural features that thwart more aggressive and inclusive growth. At the same time, weak governance and planning could mean that that economic systems change without the transformation necessary for job creation and robust productivity growth. Resnick and Thurlow (2014) detail how this scenario unfolded in Zambia, ultimately leading to the overthrow of the government.

4 Advancing towards structural transformation in Sub-Saharan Africa

Despite substantial structural issues, the first decade of the 21st century brought significant progress in agricultural productivity growth after decades of decline or stagnation (Block 2014), albeit with important divergence between countries (Barrett and Upton 2013). Overall, agricultural value added (constant 2010

US$) per agricultural worker increased by 2.4 percent per year for Africa as a whole, while cereal yields increased by 2.2 percent.[13]

Part of the accelerated productivity growth is attributable to renewed government commitments to promoting and improving the agricultural sector, as reflected in the CAADP goals related to promoting agricultural markets and regional integration, improving farmers' access to markets, combating inequality, and advancing agricultural technology. The largest strides have been made where concerted investments have taken place. For example, the New Rice for Africa (NERICA) program, led by Africa Rice, an international research center based in Côte d'Ivoire, introduced and promoted new, interspecific cultivars of rice developed through tissue culture techniques to cross African and Asian varieties that do not naturally interbreed. The resulting varieties have generated significantly greater yields and spread widely in West Africa over a short period of time.

The release of new crop varieties and rates of farmer-level adoption of improved varieties also increased noticeably from 1997–98 to 2009–10, perhaps signaling some progress in agricultural research and development (AR&D) and its impacts in SSA that bode well for the years ahead (Alene *et al.* 2011). Meanwhile, a global initiative successfully eradicated rinderpest, a disease that affects cattle and can be disastrous for Sub-Saharan African pastoralists; the last outbreak was reported in 2001.[14] To date the vast majority of progress in developing improved plant and animal genetic material and natural resources management practices for Sub-Saharan African agriculture have come from publicly or philanthropically funded national or international research efforts. Private sector AR&D, though growing, remains nascent.[15]

The spread of information and communication (ICT) technology unlocks further potential, in particular by making markets more efficient and reducing price dispersion (Aker 2010, Aker and Mbiti 2010). The limited available evidence points to strong, albeit heterogeneous impacts. The rollout of extension programs through ICTs is still in its infancy (Nakasone, Torero and Minten, 2014). Overall though, despite promising examples of positive impacts on rural livelihoods of ICT—the so-called digital dividends—these have not yet scaled up to the extent expected (Deichmann, Goyal, Mishra 2016). Technology is helping address some of the barriers, but as with any successful intervention in agriculture, simultaneous complementary interventions on different fronts will be needed (on which, more below).

A recent update on our understanding of African agricultural and rural areas, drawing on six nationally representative LSMS-ISA household surveys (from Ethiopia, Malawi, Nigeria, Niger, Tanzania, and Uganda) [16] further shows that while fertilizer and agro-chemical application rates remain very low in several countries in the region, they also have become substantial in several others, including in certain areas within countries (Sheahan and Barrett 2016). This has been fueled in part by government subsidy programs and high-level attention afforded to the subject by the 2006 Africa Fertilizer Summit in Abuja. Country-level factors, embodying policy and broader institutional phenomena, appear most important in driving agricultural input adoption.

Careful study of rural factor markets shows substantial activity in labor and land rental markets. Twenty to 40 percent of farmers rent or borrow land and 30 to 50 percent of farmers hire labor across SSA (Dillon and Barrett 2016). At the same time, household factor endowments (labor, land) still affect

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[13] *World Development Indicators,* consulted November 26, 2016.

[14] The Global Rinderpest Eradication Programme report, http://www.fao.org/ag/againfo/resources/documents/AH/GREP_flyer.pdf.

[15] Private firms surveyed in 27 African countries invested around USD 26 million in AR&D, representing only 2 percent of the total research investments that year, with South Africa alone responsible for nearly two-thirds (Beintema and Stads, 2006). Since then, there has been an increase in private AR&D investments, in particular in the seed industry (Pray *et al.* 2011). For example, in 2008, private AR&D in Kenya and Senegal amounted to USD 1.6-3.2 million and USD 3.6-4.7 million, respectively, representing 0.25-0.05 percent of agricultural GDP in Kenya and 0.18-2.4 percent in Senegal (IFPRI *et al.* 2011).

[16] These studies were largely completed under the auspices of the World Bank's Agriculture in Africa: Telling Facts from Myths project (http://www.worldbank.org/en/programs/africa-myths-and-facts) and are forthcoming in a special issue of *Food Policy*.

the extent of labor and land use in smallholder farming, which is clear evidence of continuing pervasive market failures. These market failures are not specific to a given sub-population (e.g., women or remote locations), but rather appear general and structural in nature (Dillon and Barrett 2016). Financial markets for agriculture remain especially underdeveloped. Traditional (formal or informal) credit use remains especially low, with farmers primarily financing modern input use purchases with cash from nonfarm activities and crop sales (Adjognon et al. 2016).

Population growth, urbanization, income growth, and increased connectivity have all fueled growing demand for food across Africa, and increased agricultural market integration, as food marketing channels are showing early signs of value chain transformations similar to what occurred in Latin America and East and Southeast Asia over the past 20 years (Reardon and Timmer 2007; Gómez *et al.* 2011). These food marketing channels are generally domestically oriented, however, in spite of the attention paid to export promotion. In part because of the high costs of commerce due to poor infrastructure, regulatory and competition issues along the value chains, and unpredictable trade policies, an unusually large share of food consumed in SSA is produced within the same country where it is eaten, with virtually all of the remaining imports coming from outside the continent.[17]

Between 1980 and 2009 the share of domestic food production consumed at home routinely exceeded 90 percent and increased, on average, over the period. As global prices and SSA food demand have increased, the region continues to rely heavily on its own output to feed its population. Net imports have increased slightly, especially for cereals and meat, from 15 million to 26 million tons and from 0.4 to 1.4 tons, respectively, during 2000-2011, but most of the region's added food demand has been met by expanded SSA food production (not least also through the expansion of root and tuber production). The long-standing differences between coastal and land-locked countries have become more pronounced in the past decade, with the landlocked SSA states now obtaining up to 95 percent of total food from domestic production. The highly domestic orientation of SSA agriculture accentuates the opportunity and necessity of agricultural structural transformation and of development of viable food value chains to efficiently move food from farms to growing cities. Increasing regional food trade across countries within Africa would further open up opportunities for a number of countries with higher agricultural potential to supply neighbors that currently meet their rising cereal and meat demand with imports from outside the continent (Brenton 2012). And as structural transformation trends continue to pick up in Africa, an impending *dietary transformation* will quickly follow, adding new jobs to the agri-business sector in turn (Tschirley *et al.* 2015).

The dietary transformation can help the transition towards off-farm employment as well as the structural transformation in agriculture itself (by providing access to capital). While 70 percent of rural households (across 14 national surveys in 9 SSA countries) were already found to participate in nonagricultural activities, at 31 percent, nonagricultural income shares are still well below those in other developing countries in the sample (54%) (Davis, Di Giuseppe and Zezza 2016). A substantial part of this difference relates to differences in levels of development (GDP per capita) that spur demand for non-food goods and services. But this difference also reflects much lower engagement in nonagricultural wage employment in rural Africa. By contrast, shares of nonfarm self-employment income are comparable across countries of similar level of development. This points to the need for greater attention on growing formal non-farm businesses in rural areas and small towns across SSA.

5 Policy implications for stimulating agricultural and rural transformation in Africa

Promoting the structural transformation of African agriculture and of the rural spaces within which most agricultural activities occur is essential to advance an inclusive growth agenda in Africa. But researchers have yet to convincingly identify precisely the reasons for sharp intersectoral productivity differentials that keep agricultural labor productivity so low in Africa. Most likely there are multiple

[17] Only an estimated 5 percent of Africa's 26 million tons of net cereal imports in 2011 was provided by African farmers (Brenton 2012).

reasons, each of which lends itself to distinct policy interventions. These policy priorities are best grouped into six distinct domains.

1. *Invest in physical and institutional infrastructure to remedy deficiencies that differentially penalize agriculture*. For decades, there has been public and private underinvestment in rural areas.[18] This was true for infrastructure, such as roads and water, for public services, such as education and police protection, and for private services, such as finance. In response, rural households and firms still hold too much capital in liquid and unproductive forms as a strategy to manage risk in the face of thin and highly imperfect credit and insurance markets, and invest too little in productivity-increasing capital, such as education, irrigation or machinery, and variable inputs, such as improved seed or fertilizer. SSA governments need to learn from the experience of countries that successfully shifted investment priorities in favor of rural growth and benefited from the pre-existing disequilibrium in rates of return, at least initially, as real value added per farm worker increased rapidly due to both increased factor productivity within agriculture and to increased efficiency in factor allocation across sectors.
    a. Reversing urban bias requires concerted, large-scale public (or philanthropic) *investment in village-level physical and institutional infrastructure* in order to crowd in private investment. But such investments need not be undertaken exclusively by government. Rural roads, electricity, telephone, internet, financial and agricultural extension services can all be delivered by private providers if offered adequate incentives. The state can play a valuable role by providing essential (especially transport) infrastructure and facilitating the emergence of networks of profitable private providers. The mobile telephony revolution that has swept SSA over the past generation serves as an important example to try to replicate, with private providers, supported by government, inducing a rapid increase in rural labor productivity and improvements in rural market performance and standards of living (Aker and Mbiti 2010, Aker and Fafchamps 2015). Africa now also seems on the cusp of rapid electrification of its rural towns and villages through off-grid solar power (The Economist, 2016).[19] First evaluations of low cost solar kits point to positive effects on household energy expenditures, health, domestic productivity and the environment (Grimm *et al.* 2016).
    b. Because structural transformation requires redirecting attention downstream, beyond farm-level production to post-harvest distribution and value addition, the other essential public goods

[18] This has been further compounded by several decades of distortion of trade and price incentives against agriculture, with the nominal rates of assistance in 2000-2004, on average across study countries and crops, still 20% lower for agriculture than for nonagriculture, implying a transfer of resources from farming to nonfarming households (Anderson and Masters, 2009). In low income settings, public investment is generally inadequate in both rural and urban settings. Even so, the investment pattern would be distorted if the marginal returns to welfare of public investment in rural areas are much larger than those to investment in urban areas. Testing this in practice proves hard. One rule of thumb, derived from this budget allocation rule, is to compare the sector's share of public investment with its share in GDP. For agriculture-related investments (R&D, irrigation, extension, market infrastructure, subsidies) this suggests substantial bias towards nonagricultural sectors—the share of public investment in agriculture being at most a third of agriculture's share to GDP (5.18 percent on average during 2000-2014 compared with 17 percent in 2013 respectively) (Goyal and Nash, 2016). Such comparative analysis is not available for rural investments that support agriculture (rural infrastructure, education and health). Yet, evidence on their returns (especially rural roads and electricity) suggests that they are substantial, both in terms of agricultural performance and poverty reduction (Mogues and Benin, 2012). Combined with the large rural-urban gaps in public good provision, this indicates, at a minimum, that investment in rural physical infrastructure pays.

[19] The precipitous drop in prices—the costs of solar panels dropped 80 percent since 2010—and the limited economies of scale in operation reduce entry barriers. The development of energy saving devices, such as light-emitting diodide (LED) bulbs, but also phones, irrigation pumps, etc., have reduced the amount of energy needed to power productivity-enhancing devices. Finally, "pay-as-you go" business models further enable selling electricity as a service and reduce payment enforcement costs. Together, these developments are rapidly bringing electric power within the reach of the poor and will increase productivity in agriculture (e.g., by powering irrigation pumps) and nonagricultural activities (e.g., lighting shops, cooling manufacturing plants, mechanizing hairdressing and tailoring).

required are *reliable and transparent contract law, grades and standards and police protection* that reduce the transactions costs that burden agricultural value chains and that lead to precautionary behaviors that significantly add to the costs of commerce in African agriculture (Fafchamps 2004).

2. *Address the water and soil constraints that hold back agricultural productivity.* Agricultural productivity depends uniquely on the productivity of the natural resource base on which the sector depends. As soils and water sources degrade, it undercuts growth in agricultural labor productivity and retards structural transformation.
   a. SSA is by far the world's least irrigated agricultural region, largely because it remains too expensive for farmers to withdraw groundwater given the cost of fuel and limited access to credit to invest in pumps and pipes. But the physical potential is considerable. Emergent technologies, such as solar-powered methods for withdrawing abundant groundwater supplies during periods of maximal evapotranspiration (Burney *et al.* 2009) or treadle pumps (Kay and Brabben 2000), could prove transformative if cost-effective means of financing uptake and maintenance emerge (Cervigni and Morris 2016). When irrigation becomes affordable, attention then needs to turn to the complementary infrastructure that is necessary to facilitate improved technology adoption (Gollin, Morris and Byerlee 2005).
   b. In a similar spirit, *integrated soil fertility management* methods to end or even reverse soil degradation could substantially increase yields without stimulating sharply increased reliance on unaffordable, imported fertilizers (Place *et al.* 2003; Sanginga and Woomer 2009; Vanlauwe *et al.* 2010). Efforts to promote the integrated use of agroforestry, fallows, inorganic fertilizers, legumes, and manure have the potential to fix carbon, restore soils, and even combat desertification but need explicit encouragement and investment in order to help break cycles of poverty (Barrett and Bevis 2015).
   c. African states need to *improve the security of resource tenure generally and the terms and transparency of land contracts and deals specifically*. Continued increase in external demand for land and water will spark further large-scale land acquisitions to bring more uncultivated arable land into production. These have the potential to boost agricultural productivity through judicious investments that might close yawning yield gaps in undercapitalized African agriculture and generate environmentally and socially sustainable food supplies for domestic and regional markets. But if land and water deals occur in a less than transparent fashion, with little or no objective monitoring and evaluation, and without increased safeguards on the tenurial security of traditional cultivators and herders, then legitimate concerns will build around dispossession of the rural poor and despoliation of increasingly fragile natural resources and the prospect of productivity-reducing and poverty-increasing social unrest will rise. Land deals and enhanced tenurial security may lead to farmland consolidation, which can help stem the growth in farms too small to be commercially viable and to effectively absorb surplus labor (Jayne *et al.* 2003; Adamopoulos and Restuccia 2014; Collier and Dercon 2014).

3. *Invest in the development and diffusion of new agricultural technologies appropriate to Sub-Saharan Africa*. The yawning productivity gap between African smallholder agriculture and farmers elsewhere in the world offers the promise of productivity growth on the existing resource base. While price policies suffer from the food price dilemma—e.g., raising food prices to help farmers hurts consumers, and vice versa (Timmer, Falcon and Pearson 1983) — total factor productivity improvements improve farmer profitability while concentrating most welfare gains in the hands of poorer farm workers and consumers, who spend a large share of their meager incomes on food commodities (Minten and Barrett 2008). This will necessarily take a different form than the earlier Green Revolution in Asia, which developed and disseminated a few blockbuster improved seed varieties along with mass-produced inorganic fertilizers and standardized irrigation methods across vast homogeneous landscapes. The patchwork quilt of SSA's heterogeneous agro-ecologies

necessitates highly localized solutions. That will require sharply *expanded investment in local, national and regional AR&D systems* that currently lack adequate scientific capacity to develop animal and plant genetic material and complementary inputs well-suited to local agro-ecologies and consumer tastes.

a. *Productivity improvements may be enhanced by enabling adoption of genetically modified (GM) foods*. It will also require *removing regulatory obstacles to the development of GM crops* designed to better withstand stresses like drought, pathogens, and pests. The use of GM crops requires adequate biosafety controls, but external political pressure has induced overreaction against GM seed adoption in SSA, with adverse consequences for the region (Paarlberg 2002). Thus far, although many SSA countries have active research programs of on-station or even on-farm research with GM varieties, South Africa, Burkina Faso and Sudan are the only SSA countries with open cultivation of GM crops, and GM food crops are commercially grown only in South Africa, as Burkina Faso and Sudan grow only GM cotton commercially (James 2013). The need for GM options will increase in the years ahead, especially in the face of climate change. Therefore, SSA countries need to get responsible, rigorous but not onerous biosafety controls in place and ignore the external political pressures to pass on modern biological science. GM adoption has also worked best when domestic research institutions are involved in their development (World Bank 2007). And evidence from South Asia shows that small farmers whose financial liquidity constraints otherwise limit their ability to apply agro-chemicals especially benefit from yield increases arising from GM crops (Qaim and Zilberman 2003; Qaim 2015).
b. A related priority area for agricultural research is *animal disease management*, including of zoonotic diseases related to manure management that African governments have typically been unable to regulate effectively. If the African agricultural research and veterinary care community can contain poultry diseases and trypanosomiasis, thereby opening vast new areas for cattle, the impacts of reduced risk and adverse spillover effects could be considerable on productivity growth, as well as on animal-source food supplies and prices. Africa's land abundance and limited water control gives it comparative advantage in livestock production. And both herd sizes and animal product output have been increasing rapidly in SSA over the past decade.

4. *Focus as much on the post-harvest value chain and the rural non-farm economy as on farm-level production.* African smallholder farmers are generally 'poor but efficient' (Schultz 1964). But the traditional input systems that supply them and the value chains that evacuate, aggregate, process and distribute their harvests are demonstrably inefficient (Fafchamps 2004; Reardon *et al.* 2009; Brenton 2012). A growing body of evidence suggests that modern agricultural value chains effectively internalize many of the externalities that lead to inefficiency in traditional agriculture in SSA (Swinnen 2007; Reardon *et al.* 2009; Barrett *et al.* 2012). The appropriate mode of organization of the post-harvest value chain varies dramatically by crop and location, but whether it is vertical integration, coordination mechanisms through outgrower schemes or contract farming arrangements, or other forms, the emergence of new modes of linking farmers to consumers is slowly bearing fruit in African agriculture, not least of which by promoting uptake of modern inputs, innovation in natural resources management and post-harvest practices, and upgrading of quality control (Reardon and Timmer 2007; Swinnen 2007; Reardon *et al.* 2009). At the same time, the rapid expansion of telecommunications and electrification into secondary towns is stimulating robust growth in the non-farm sector that appears to have greater productivity boosting and poverty reducing effects than does rural-to-urban migration (Christiaensen and Todo 2014). Structural transformation will require accelerated expansion of downstream agricultural value chains and rural towns, as well as of nontraditional, higher-value agricultural products.

5. *Encourage the emergence of rural financial institutions and products* to help African farmers and traders manage risk more efficiently. The agricultural sector is subject to far greater risks than are other sectors, especially in SSA (Hardaker *et al.* 2004). And the biological lags intrinsic to

agricultural production, especially of higher-value perennials and livestock, create a significant delay between investment and payoff that commonly requires financial intermediation. This even holds within the year as demonstrated by the persistence of substantial excess seasonality in food prices (Gilbert, Christiaensen and Kaminski 2016). So whether for credit or insurance, the agricultural sector commonly needs reliable access to financial services and more so per unit value added than do other sectors. Yet the continent's under-developed financial markets, especially in rural areas, differentially depress the productivity of labor and land inputs used in agriculture and discourage investment in costly inputs, like fertilizers or improved seeds, that might increase the risk farmers face (Dercon and Christiaensen 2011; Barrett and Carter 2013). Furthermore, when combined with the economies of scale intrinsic to financial products, the small scale of most SSA farms compounds the disadvantage of the agricultural sector (Carter 1988; Besley 1995). The multiple financial market failures that pervade rural Africa generate many 'displaced distortions' apparent in seemingly-irrational resource allocation patterns and poverty traps that perpetuate low productivity and ultra-poverty (Barrett 2007; Barrett and Carter 2013).

6. *Build rural human capital through improved preventive and curative health care and primary and secondary education systems* that ensure a healthy and able workforce. Urban bias in the provision of such public goods has led to a concentration of the lowest ability workers in agriculture, which some analysts hypothesize accounts for the stark observed sector gaps in labor productivity (Lagakos and Waugh 2013). Furthermore, the intergenerational transmission of education and health status from parents to adult children is a well-established empirical regularity worldwide that tends to reproduce low agricultural labor productivity over time within rural communities (Ahlburg 1998; Black, Devereux and Salvanes 2005; Barrett and Carter 2013). Quite apart from the intrinsic benefits of improved current well-being, direct health and nutrition interventions among pregnant and lactating women and their young children offer well-documented high long-run returns, including in adult labor productivity of affected children (Casasnovas, Rivera and Currais 2005; Hoddinott *et al.* 2008; Victora *et al.* 2008). A workforce with limited human capital has limited ability to innovate, to effectively deploy new technologies the effectiveness of which depends in part on skill, or to take advantage of emergent market opportunities. Rural nutrition, health and education investments are therefore essential complements to each of the other policy priorities discussed above.

6 Conclusions

We know from the development experiences of other regions of the world that rapid structural transformation from a poor agrarian economy to a high-income industrial one is feasible and can bring with it rapid, mass exodus from extreme poverty. Real agricultural output growth rates are accelerating in SSA, nearly doubling from the 1980s rate so that per capita output and agricultural labor productivity are growing again, helping reduce rural poverty rates and stimulate inclusive economic growth. Uptake of modern agricultural inputs, in particular inorganic fertilizers, improved seed and agro-chemicals, has increased sharply in several areas in the region, and modern agricultural value chains are likewise emerging. While Sub-Saharan Africa remains home to more than half of the world's extreme ($1.90/day per person) poor (and more than 83 percent of the world's ultra poor ($0.95/day per person, or half the extreme poverty line), most of them concentrated in rural areas and dependent on agriculture, there are clear signs of progress that indicate the real prospect of structural transformation within the coming generation. The policy and donor communities are now appropriately focusing on how best to stimulate investment incentives, productivity growth, risk management and productive transitions that can accelerate the structural transformation of African agriculture and rural economies. These broad foci are appropriate and reasonably well-grounded in both theory and empirical evidence.

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