



Agricultural Policy Research in Africa



AGRICULTURAL GROWTH TRENDS IN AFRICA

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ABBREVIATIONS AND ACRONYMS

ACET	Africa Center for Economic Transformation
AfDB	African Development Bank
AGRA	Alliance for a Green Revolution in Africa
APRA	Agricultural Policy Research in Africa
CAADP	Comprehensive Africa Agriculture Development Programme
DFID	Department for International Development
DHS	Demographic and Health Survey
FAO	Food and Agriculture Organization of the United Nations
FAOSTAT	Statistics database of the Food and Agriculture Organization of the United Nations
FARA	Forum for Agricultural Research in Africa
GDP	Gross domestic product
ISA	Integrated Survey on Agriculture
LSMS	Living Standards Measurement Survey
MAFAP	Monitoring and Analysing Food and Agricultural Policies [programme]
NEPAD	New Partnership for Africa's Development
NGO	Non-governmental organisation
SACU	Southern African Customs Union

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EXECUTIVE SUMMARY

This paper reviews thinking about agricultural development in Africa since 2010, and the record of agricultural development in the continent since 1990. Recent literature on agricultural development focuses on five broad themes:

- The role of agriculture within overall economic growth with structural transformation;
- The extent of agricultural intensification and productivity improvements and how to remove barriers to adoption of improved technology – complemented by an interest in innovations in the supply chain;
- The demand for land, land deals, and the apparent emergence of medium-scale farms as a significant sub-sector within agriculture in some countries;
- The need to make agriculture environmentally sustainable and climate smart; and
- Thinking about policies and investments for agricultural development.

The background to agricultural performance in Africa since 1990 is that of renewed economic growth across much of the continent, but with limited structural transformation, and above all, development of manufacturing. Agricultural output has doubled or more in most countries since 1990; but given rapid population growth, the gains per person have been much more modest, although generally positive. Much of the increased output has come from large additions to labour and land, but land productivity has been rising – by around 50 percent since 1990, albeit from a low base.

Despite agricultural growth, increasingly most parts of Africa are experiencing a widening deficit on agricultural trade. This arises largely from very rapidly rising imports, rather than a failure to export: on the contrary, exports have increased faster than growth of agricultural output since 1990.

For the 12 countries reviewed in this paper (Benin, Burkina Faso, Côte d'Ivoire, Ethiopia, Ghana, Kenya,

Malawi, Mozambique, Nigeria, Senegal, Tanzania, and Zimbabwe), the incidence of poverty has been falling in most countries since 1990, as has the incidence of stunting among young children. Agricultural growth per person does not seem to be associated with changes in poverty for the 12 countries, but does seem to be correlated with improvements in child nutrition, even if not strongly so.

Since the 1990s, ideas about agricultural development have changed considerably. Agriculture has returned as a development priority, making the question of how to raise productivity of farms a central question. Current favoured approaches see the private sector as driving investment and innovation in agriculture, with the state facilitating by investing in rural public goods. That then makes the question of how to overcome failings in rural markets for inputs, finance and services critical.

Scale of production presents a conundrum: although smallholder development may be feasible and desirable, in some countries land acquisitions, mainly by domestic investors, have led to the formation of a significant group of medium-scale farms. Their emergence may lead to productive links to smaller-scale farms, but it carries the danger that the medium-scale farms will seek to monopolise land, access to public services, and markets, marginalising smallholders.

A further challenge is that of making agriculture environmentally sustainable and climate smart. While most agree on the ends, it is not clear that the means are yet sufficient to address this.

In many respects, the context for agricultural development has changed for the better since 1990. Renewed growth with urbanisation is creating markets for farmers, especially for higher-value produce. The deficit on agricultural trade provides scope for substituting domestic for imported production.

The opportunities for increased commercialisation are clear, in domestic and international markets. The means to produce and market more are greater than in the

past. The political priority to agricultural development is promising. However, substantial challenges arise in overcoming the disadvantages that smallholders face in rural markets, the need to generate decent jobs for the large youth cohorts stepping into the job market, and making agriculture environmentally sustainable and climate smart.

OVERVIEW

This paper sets out the main features of the context for smallholder commercialisation in sub-Saharan Africa, so as to inform the research planned for the Agricultural Policy Research in Africa (APRA) consortium.

It does so by reviewing thinking about agricultural development since 2010 or so, and by examining the performance of African agriculture since 1990.

Changing ideas about agricultural development

Since 2010, five broad themes can be seen in the literature on agricultural growth and performance in Africa.

One deals with agriculture and its relation to economic growth and structural transformation. The revival of economic growth in many African countries since the early 1990s has been welcome, but observers have been concerned that much of this growth has come from agriculture and mining, buoyed up by the commodity price boom of 2008 to 2014; rather than through growth of services and industry, above all the development of manufacturing. Economic growth has not, it seems, been accompanied by the transformation in economic structure from agriculture to services and industry seen in the history of high-income countries and in the emerging economies of Asia. For Africa, that puts the onus on agriculture, not only to provide livelihoods for large rural populations that for the time being cannot find more productive employment in industry, but also to raise productivity in farming to make it possible for some labour to move to other sectors without loss of agricultural output.

A second theme, reflecting a longstanding concern over low yields per hectare, is that of agricultural intensification and the extent to which farmers are using inputs that potentially could raise land productivity. The majority of rural Africans now live in quite well settled zones, where the land frontier is either closed, or closing fast. Such areas have conditions that should encourage Asian-style intensification. This is taking place to some extent, but use of external inputs often remains low, and farm households increasingly gain much of their income from non-farm activity.

This leads to questions about how to remove the obstacles to adoption of more productive technologies. These variously may be high transport costs, undue exposure to risk, high transaction costs in input and financial markets, insecure tenure, and inadequate knowledge about improved technology. Since 2000, a profusion of measures to mitigate these obstacles have been piloted, with an associated literature that evaluates the results.

In parallel to efforts to raise productivity on farms, some agricultural supply chains have seen substantial changes as processors, retailers and exporters have invested in improved logistics and more direct links to farmers. The changes bring opportunities for farmers, but also present them with stiff challenges in producing to the standards and timing required by buyers.

Three, the commodity price boom in 2008 gave rise to international demand for land in Africa to grow food and biofuels, usually from large farms. While many of the deals announced did not materialise on the scale contemplated, domestic investors in some countries have been able to acquire land in medium-scale farms, to the extent that they have become significant actors in agriculture. The full implications of this trend remain to be seen.

Four, the need to make agriculture more environmentally sustainable, adapted to climate change and with reduced greenhouse gas emissions is increasingly recognised. It is not, however, clear that investment and policy has been sufficiently redirected to respond adequately to these challenges.

Five, policy thinking and practice have shifted away from the considerable biases against agriculture in the 1970s and 1980s, and the neglect of investment in the sector. The 2000s have seen agriculture rise as a policy priority in many parts of Africa. Nevertheless, farmers still have to cope with high costs in supply chains and from under-investment in rural public goods. Although many countries have spent more on agriculture following the Maputo Declaration of 2003, increased spending has often tended to be on transfers, such as fertiliser subsidies, rather than on investments

that might generate greater long-run increases in productivity, such as rural roads and research.

Agricultural development since 1990

Agricultural performance has been reviewed for Africa, its five component regions, and for 12 selected countries, including the focus countries for the APRA consortium. As far as possible, Africa's performance has been compared to that of three regions of Asia: Eastern, Southern and Southeastern. In addition, economic growth, changes of economic structure, and outcomes in poverty and nutrition in Africa have been examined.

Across much of Africa, **economic growth** has returned after the doldrums of the 1980s. Growth rates since 1990 match those seen in parts of Asia. However, given the rapid population growth of Africa, growth per person has been much more modest, well below Asian levels, even if positive.

Structurally, agriculture has seen a modest decline in its share of the economy, as services and industry have increased their share – as would be expected and desired for development. Nevertheless, structural transformation is not as developmental as some would like, since manufacturing is, if anything, shrinking as a share of the economy in many countries of Africa.

Population growth remains high across much of Africa. Rural populations may be growing more slowly than national populations, but they are still increasing at around 1–2 percent a year in the 2010s, with only a slow reduction in the rate of the growth since 1990. Fertility levels in rural Africa are much higher than in Asia and falling slowly. Hence, population density is rising in most rural areas. For at least another generation most rural areas will accommodate more people, with denser settlement and consequent pressure to subdivide smallholdings on the deaths of current heads of households.

Agricultural output has grown quite strongly in Africa since 1990, doubling or more in most cases. The increases in output are similar in scale to those seen in Asia over the same period. When, however, population growth is taken into account, the gains in agricultural output per person are much more modest, although positive for most regions and countries of Africa. African agricultural growth per person lags well behind that of Asia, where population growth has been much less rapid.

Increased farm output in Africa has come primarily from considerable additions of land and labour since

1990. Even so, land productivity has risen in much of Africa by around 50 percent since 1990, an effect that can be seen for the specific case of maize yields. The qualification is that land productivity in the early 2010s in Africa is for most areas still low, well behind that seen in Asia. Yields of many crops are much less than can be achieved by applying better technology.

With less reliable data, the indications from half a dozen African countries are that **labour productivity** has been rising as well, but modestly so – with increases typically of between 30 percent and 60 percent since 1990.

African farm output remains dominated by staples: cereals, roots and tubers, and pulses. Since 1990, little change can be seen in the **composition of output**.

The balance of **agricultural trade** for Africa has seen an increasing deficit since 1990, with a widening gap between the values of exports and imports. For sub-Saharan Africa, the agricultural trade balance worsened from a surplus of US\$2.4 billion to a deficit of US\$9.5 billion between 1990 and 2013.

That has not, however, been caused by a failure of exports. On the contrary, the value of farm exports has increased at a faster rate than growth of output since 1990: an increasing share of agricultural output is being exported across much of Africa. The trade deficit arises from the even faster increase in agricultural imports. Cereals imports to Africa, in particular, have increased almost four-fold since 1990. Some of those imports, however, are less the result of domestic agricultural shortfalls, and more the consequence of urban populations demanding staples seen as superior, such as wheat and rice, in preference to indigenous staples such as cassava, yam, millet and sorghum.

Looking at **welfare outcomes** of poverty reduction and stunting for the selected countries reviewed, the incidence of poverty has been falling in most countries since 1990. Greater and more widespread declines can be seen for the stunting of children over the same period. Senegal, Ghana and Ethiopia, for example, have all cut more than 40 percentage points from the incidence of stunting since the late 1980s.

Since 1990, agricultural growth per person does not seem to be associated with changes in poverty for the 12 countries, but does seem to be correlated with improvements in child nutrition, even if not strongly so.

Messages for APRA

In 1990, much of sub-Saharan Africa had experienced almost no economic growth per person since the

early 1970s. Agriculture was growing slowly, in many places failing to match population growth. Pessimism about the prospects for agricultural development, and development in general, was deep and pervasive. Indeed, during the 1980s and 1990s aid donors reduced their spending on agricultural development in Africa, since they saw agriculture as a difficult business where projects were too prone to failure.

By 2018, things had changed. Both thinking about agricultural development and the circumstances in which it takes place are very different. In recent thinking, agricultural development has returned as a strong priority within strategies and plans for development in many countries of Africa. Even those who stress the importance of transforming the economies of Africa away from agriculture and primary production, towards urban-based industry and services, recognise that this will be much facilitated if agriculture can become more productive. Moreover, those favouring industrialisation see developing industries in the agricultural supply chains that process farm output as a prime means to develop industrial competences.

A broad consensus on agricultural development in the 2010s can be seen. A central focus is the need to raise productivity in agriculture through the application of proven technology. To realise this, government has to provide the conditions to enable this – a supportive investment climate and rural public goods; but beyond these, private initiative is paramount. Farmer investment and innovation is to be very largely facilitated by private firms supplying inputs, advice, finance and buying and processing output. This raises questions about how to overcome the shortcomings of rural markets that so far have left most smallholders without access to quality inputs, services and finance at reasonable cost. Across Africa, a plethora of initiatives by governments and their development partners, non-governmental organisations (NGOs), farmer groups and private firms can be seen that try to remedy those failings.

Strategy papers from Africa-wide centres in the 2010s concur that agricultural development needs to focus first and foremost on smallholders, with their development seen as both feasible and desirable. This emphasis is not shared by all governments, where some voices argue that modernisation of agriculture must necessarily mean (at least some) farming at medium and large scales. Nor does it always reflect changes on the ground. The international land deals sparked by the spikes in world prices in 2008 may for the most part not have come to fruition; but the acquisition of land by domestic investors based in urban areas to create

medium-scale farms seems to have taken place on a considerable scale in several countries.

On the one hand, the new medium-scale farms may provide a proving ground for measures to assist agricultural development: the more diverse the farm structure, the more models of input supply, finance and marketing that can be tested. Useful partnerships may even be forged between smaller- and larger-scale farmers. On the other hand, the dangers of rentier interests are clear: that the medium-scale farms will seek to monopolise land, access to public services, and markets, marginalising smallholders in the process. A further challenge lies with the environment, in some areas increasingly under pressure from rural population growth, as well as from climate change that is already altering the weather. The need to adopt more sustainable practices that are also adapted to changing climate, preferably also mitigating emissions of greenhouse gases is almost universally recognised. It is, however, not clear that policies and investments are being redirected sufficiently to address these challenges.

Policies for agriculture have changed considerably from those seen in the 1970s and 1980s, when heavy implicit taxation of farmers often stymied agricultural development. Yet recent policies are far from perfect. Farmers' returns are diminished by high costs in supply chains. Public support to agriculture tends to take the form of input subsidies, rather than investments in roads and research that can have greater impact on productivity and hence higher pay-offs over the medium-to-long run.

It is not hard to see why policies are less than optimal: transfers and subsidies are vote winners in ways that agricultural research rarely, if ever, is.

As ideas have changed, so too have the circumstances in which agriculture develops. In many respects, the context for development has changed for the better since 1990. Across much of sub-Saharan Africa, economic growth has resumed, with quite rapid growth in some countries. Urbanisation, with an associated middle class, is creating markets for farmers, especially for higher-value produce. The deficit on agricultural trade provides scope for substituting domestic for imported production.

This, then, is the context for the commercialisation of agriculture in sub-Saharan Africa. The opportunities for increased commercialisation are clear, in domestic and international markets. The means to produce and market more are greater than in the past. The political

priority to agricultural development is promising. However, substantial challenges arise in overcoming the disadvantages that smallholders face in rural markets, the need to generate decent jobs for the large youth cohorts stepping into the job market, and making agriculture environmentally sustainable and climate smart.

1. INTRODUCTION



This paper sets out some the main features of the context for smallholder commercialisation in sub-Saharan Africa, so as to inform the research planned for the Agricultural Policy Research in Africa (APRA) consortium.

It does so by reviewing thinking about agricultural development seen since 2010 or so, and by reviewing the performance of African agriculture since 1990. In so doing it helps address the debates about the feasibility of developing smallholder agriculture through commercialisation. In particular, it addresses the following questions:

- How has thinking about agricultural development evolved since 2010? How has the context for smallholder commercialisation evolved?
- How much growth of agriculture and agricultural productivity has been seen in Africa since 1990? How much does agricultural growth correlate with change to national income, poverty and nutrition?

The rest of the paper consists of three sections. Section 2 reviews the more pertinent literature on agricultural development in sub-Saharan Africa since 2010. Section 3 reviews the evidence on economic growth, agricultural development, and development outcomes for different regions and selected countries within sub-Saharan Africa. Section 4 concludes and discusses the implications.

2. RECENT THINKING ABOUT AGRICULTURAL DEVELOPMENT IN AFRICA

Recent thinking about agricultural development in Africa addresses both some longstanding concerns, such as how to increase the uptake of more productive crop technology among smallholders; as well as more recent interests arising from changing circumstances in Africa – and from changes external to Africa. Ideas can be grouped into five broad themes:

- Economic growth, transformation and the role of agriculture;
- Agricultural intensification and adoption of more productive technology;
- The commodity price spike of 2008 to 2014, with the consequent rush to acquire land;
- Environment and climate change; and
- Agricultural development initiatives.

These will be reviewed in turn.

2.1 Economic growth, transformation and the role of agriculture

Since the early 1990s, and especially since 2000, many African economies have been growing significantly faster than they did for much the previous two decades. For example, for 36 countries of sub-Saharan Africa excluding South Africa, average annual growth rates of gross domestic product (GDP) per person were -1.08 percent in the 1980s, -0.16 percent in the 1990s, and 3.91 percent in the 2000s (AfDB 2016). No less than 18 countries recorded growth of more than 3 percent a year per person in the 2000s (*ibid.*).

Economic growth has been accompanied by urbanisation: by 2010, 40 percent of the population of Africa were living in urban areas, compared to just 15 percent in 1960 (UN-Habitat).¹ The combination of economic growth and urbanisation has helped swell the numbers of the middle class (Mubila and Aissa 2011; Resnick 2015; Tschirley et al. 2014).

Yet there is much concern that this welcome return to growth has not been accompanied by economic transformation (AfDB 2016; ACET 2014, 2017). Much of the growth has come from increased primary activity – mining and agriculture, boosted by the increase in

value of output resulting from higher commodity prices seen between 2008 and 2014. Output from services has also grown. Growth of manufacturing, however, has been limited. Indeed, the share of manufacturing in the GDP of sub-Saharan Africa declined from 13.5 percent in 1990 to 10.5 percent in 2016 (World Development Indicators, World Bank). This alarms some observers, since manufacturing tends to have higher labour productivity than most primary and service activity. When the share of manufacturing in economic output and employment rises, then much growth occurs as workers move from agriculture to manufacturing, which almost always results in a large rise in the productivity of the workers who move (McMillan and Harttgen 2014, Gollin et al. 2012).

That said, more transformation of rural and national economies in sub-Saharan Africa may be taking place than is sometimes feared. The share of labour engaged in agriculture declined between 2000 and 2010 in 19 countries, according to Demographic and Health Surveys (DHS). Labour moving from agriculture to services and manufacturing, sectors with higher returns to labour, accounted for about half the increase in overall labour productivity seen in the last decade (McMillan and Harttgen 2014; McMillan and Headey 2014).²

Moreover, the growth of cities may offer opportunities for labour to produce and earn more than in rural areas, thereby boosting economic growth, according to economic modelling for Ethiopia and Uganda (Dorosh and Thurlow 2012). At least two qualifications apply, however. One is that the much higher mean earnings in urban compared to rural areas may result from a small fraction of urban jobs being relatively highly paid: median urban wages may not be that different to farm earnings (Chuhan-Pole and Ferreira 2014). Two, the attraction of cities may lie less in job prospects, and more in the public services and other amenities on offer that are rarely available in rural areas (*ibid.*).

Moreover, contrary to fears that urbanisation in sub-Saharan Africa may be premature, given economic development, rural Africans are in fact somewhat reluctant to migrate to cities, moving at an estimated average rate of just 1 percent a year from rural to

urban areas. Several reasons may explain this. In some countries, with Ethiopia the prime example, migration to urban areas has been deliberately deterred by policy. More generally, households may be reluctant to move owing to rights to collective land and other common resources in the home village that are dependent on residence. This does not necessarily stop all migration, but it can lead to migration where adult males move, but the rest of the household remain in the village.³ Migrants could also be deterred by their lack of formal qualifications that may exclude them from better paid opportunities in cities (de Brauw et al. 2013).

Given the arguments and evidence for the importance of structural transformation, it might be thought that policy should prioritise the development of non-farm, urban economies and manufacturing; with agricultural development as a secondary consideration. Yet recent analyses by Africa-wide bodies – the African Development Bank’s *African Development Report 2015: Growth, Poverty and Inequality Nexus: Overcoming Barriers to Sustainable Development* (AfDB 2016), the African Center for Economic Transformation’s *African Transformation Report 2017: Agriculture Powering Africa’s Economic Transformation* (ACET 2017), and the Alliance for a Green Revolution in Africa’s *Africa Agriculture Status Report: The Business of Smallholder Agriculture in Sub-Saharan Africa* (AGRA 2017) – all advocate putting the stress on agricultural development in general, and smallholder development in particular.

Two arguments are put forward in these reports. One is that the prospects for growth of manufacturing⁴ and higher-productivity services are currently limited in sub-Saharan Africa, so that agricultural development offers a feasible way to accelerate economic growth. This is particularly so given rising urban demand for food, the opportunity to substitute for imports, the chance to add more value by agricultural processing, and the opportunity to export agricultural produce.

The other argument concerns jobs and poverty. Agriculture is a large sector in most sub-Saharan Africa countries, especially if the agricultural supply chains are considered; hence even modest growth can create many new jobs and raise the earnings of many people on low incomes. Indeed, the longstanding argument that agricultural growth usually does more to alleviate poverty than to promote growth in other sectors, at least in low-income countries, continues to be supported by recent analyses (Christiaensen et al. 2011; Chuhan-Pole and Ferreira 2014). Even the economy-wide models for Ethiopia and Uganda deployed by Dorosh and Thurlow (2012) show more poverty reduction stemming from agricultural growth compared to urban growth.

That said, Dercon and Gollin’s review (2014) cautions on too literal interpretation of such evidence. Given the limitations of data, it is not possible to prove conclusively that agricultural growth is most effective in reducing poverty. But, as they emphasise, absence of evidence is not quite the same as evidence of absence: i.e. there are plausible reasons to expect agricultural growth to alleviate poverty, and some evidence to confirm that. The problem, however, is that we cannot be sure this will apply everywhere and always. Given the diversity of circumstances found across sub-Saharan Africa, it would be unreasonable to expect processes to be universal – no matter how hard some may search for them by ‘gold standard’ methods.⁵

2.2 Agricultural intensification, adoption of improved technology and the new supply chains

The interest in economic growth with structural transformation leads to a focus on labour productivity in agriculture. If agriculture is to grow ahead of population, to generate better incomes for farmers and farmworkers, while releasing labour to work in industry and services, then agricultural labour productivity has to increase. Given that with rising rural populations increasing numbers of farmers in Africa find that they cannot expand their land (Chamberlin et al. 2014), then growth and productivity increases will have to come from intensification of production.

Hence much recent interest has been directed to how much farmers in sub-Saharan Africa are intensifying their agriculture, and especially through the use of external inputs on their farms. The recent – since 2009 – addition of the Integrated Surveys on Agriculture (ISA) to Living Standards Measurement Surveys (LSMS) of households in eight African countries has allowed much more detailed examination of the use of inputs at regional and national levels than has previously been possible, when such insights were largely restricted to results from village and district-wide surveys.

Making use of the LSMS–ISA data, Sheahan and Barrett (2014) report that while overall use of external inputs may be low in the countries surveyed, and especially the use of irrigation and mechanisation, usage is highly varied by crop, agro-ecological zone and country. They find that inputs seem to be applied in isolation from one another, that farmers do not seem to be taking advantage of complementary interactions between, for example, improved seed, fertiliser and crop protection. Of particular concern is their finding that most farmers are not varying their application of inputs with respect to soil quality – reinforcing a longstanding frustration that extension messages on

fertilisation are rarely linked to tests of local soils.

They find that very few farmers are able to use formal credit to buy inputs, perhaps as few as one per cent. Biases show up by gender: women farmers typically have less access to inputs than their male counterparts.

A relatively recent question on intensification arises from the observation that, given rising rural populations, the majority of farmers in rural Africa now reside in areas of quite dense settlement, of 200 or more per square kilometre (Chamberlin et al. 2014). With land increasingly scarce and labour relatively abundant, parts of Africa should now have the factor ratios that encouraged the uptake of land-saving innovations that marked the Asian green revolution. This raises the question of whether the more densely settled parts of Africa are now seeing the processes that began in Asia in the late 1960s.

Headey and Jayne (2014) report that indeed, farmers are intensifying their production by reducing fallowing and cropping more frequently; but are not necessarily using more fertiliser or irrigating their crops, so that productivity growth is limited. Indeed, without the use of improved technology, labour returns would probably fall. They also report not seeing much non-farm diversification that might supplement incomes for households in densely-settled areas. In a somewhat unusual departure for agricultural studies, they observe that households in these areas are not reducing their family sizes by much, perhaps owing to lack of access to effective family planning.

For 40 countries of sub-Saharan Africa, Nin-Pratt (2015) establishes that countries with more abundant land are likely to follow extensive paths to agricultural development; yet the correlation with measures of intensification, such as fertiliser use, are nothing like as close as might be expected.⁶

For Ghana, Nin-Pratt and McBride (2014) both confirm and qualify the insights from Headey and Jayne (2014). In the most densely-populated parts of rural Ghana, farmers do not necessarily intensify their farming, although they may grow more food crops such as cassava to feed themselves. Their main response to lack of land, however, is to earn from off the farm. In this, they seem to have had some success: household incomes are dominated by off-farm earnings.

Increased commercialisation of farm output in Ghana tends to come from the more lightly-populated areas. In these areas, the main innovations evident economise on labour, such as machinery and herbicides: measures

to intensify such as application of fertiliser have not been adopted to the same degree. This may explain why fertiliser use on maize fields in Ghana is so far below the economically optimal levels, as reported by Chapoto and Ragasa (2013).

Intensification is not just a function of population pressure, agro-ecology and commercial opportunity, however. The long-observed inverse ratio between size of holding and yields per hectare persists. This shows up in the LSMS-ISA data for six countries (Scandizzo and Savastano 2015), as well as being reported by Sheahan and Barrett (2014) who use the same data base.

That does not mean, however, that small farms are good in themselves: the inverse ratio very probably arises from factor market failures that encourage smallholders to apply their own labour excessively to their own plots, rather than either hire out their labour to those with more land, or to rent in more land from them (Collier and Dercon 2014).

Not that large farms are necessarily a good thing either. Reviewing spillovers from recently established large farms in Ethiopia to neighbouring smallholders, Ali et al. (2016) find some evidence of spillovers from large farms to small, but effects are not that strong and vary greatly by crop. Having large farms close to smallholdings does not substitute for roads and other public goods that could allow those smaller-scale farmers to invest and innovate.

Intensification, it would thus seem, has been partial and patchy. Longstanding debates on why farmers apparently do not take up more improved technology remain important.

Such debates begin by considering whether indeed improved technology is available that suits local crops and animals, and farmers' conditions. While it may have taken longer to develop better agricultural technology for Africa than in Asia – owing in part to the rainfed conditions that apply to most farming in Africa, the diversity of crops, and under-investment in agricultural research (Lipton 1989, 2012) – by the 2010s much has been done to generate useful technologies. Much higher yields than are typically obtained can be achieved by using improved varieties, fertiliser and better control of water (see Larson et al. 2010 on potential increases in rice yields in Africa; Nin-Pratt et al. 2011). Moreover, village surveys often reveal large variations in yields from different farmers' fields, suggesting that some farmers obtain yields well below what can be achieved in local conditions.

Farmers may not be adopting technical improvements for any of several reasons. One is that returns to improved techniques may not generate an adequate return. When rural transport costs are high (Livingston et al. 2014; Gollin and Rogerson 2010; Dercon et al. 2009), the costs of inputs rise and output prices fall at the farm gate, deterring adoption).

Another hindrance comes from the risks that may arise with new techniques, where occasional harvest failures or slumping output prices may raise the variance of returns, even if the mean returns are higher. For farmers on low incomes with few savings, the risks may be too high. That problem is exacerbated by lack of insurance, owing to high transaction costs in rural financial markets. More generally, rural markets typically fail to supply smallholders with appropriate inputs at a reasonable price (Poulton et al. 2006; Omamo 2003), or to make available credit (Meyer 2015). Failing rural markets may thus trap farmers in poverty, even when the technical means for them to raise production and incomes exist (Carter and Barrett 2007).

Lack of secure tenure to land cultivated may, in some cases, deter adoption. Most farmers in Africa have access to land under collective tenure. The security that this offers has been much studied. Some do not see collective tenure as deterring investment: for example, Place and Hazell (1993) on Ghana, Kenya and Rwanda; Besley (1995) on Ghana; Brasselle et al. (2002) on Burkina Faso; and Place and Otsuka (2002) on Uganda.

Others, however, report collective tenure to be an obstacle. In southern Ghana, for instance, farmers were reluctant to leave land fallow to restore soil fertility, owing to fears of loss of rights to land not being actively farmed (Goldstein and Udry 2008). Farmers in Uganda have invested more on the plots they own compared to those for which they have only the right to occupy (Deininger and Ali 2008). Since collective land rights vary from place to place in the degree of security they offer, diverging observations are probably to be expected.

Finally, farmers may not know about, or fully appreciate, some innovations. Formally, public extension may either be absent or convey messages inadequately. Various models for extension have been tried with varying success: farmer field schools represent one of the more recent models to be promoted (Davis 2008). Informal channels may also transmit innovations: farmers may learn about techniques from their more successful neighbours, as seen in the case of pineapples in southern Ghana (Conley and Udry 2010).

In other cases, however, little may be learned from neighbours, as applies for maize in Western Kenya (Duflo et al. 2008).

These obstacles to technology adoption have long been observed in rural Africa. In the 2010s, some novel solutions, albeit partial, are being developed. For example, investments in roads have lowered transport costs in some areas⁷ (Donaldson et al. 2017); innovations to offer farmers micro-insurance indexed against the weather promise some relief from risk (Hazell et al. 2010); programmes to develop agro-dealer networks are making inputs more available (Belt et al. 2015), in some countries registration of land rights have strengthened security of tenure (ACET 2017), and the use of mobile text messaging and internet platforms promise to provide farmers with more and better information than before (Qiang et al. 2012).

2.2.1 THE NEW SUPPLY CHAINS

A feature of recent overviews of agricultural development in Africa (see ACET 2017; AfDB 2016; AGRA 2017; NEPAD 2013) is the recognition of the importance and potential of agricultural and food supply chains in generating employment and value-added. Significant technical changes are occurring in these chains since 2000.

Increasingly, much of the produce from farms in sub-Saharan Africa is marketed in urban areas and the product mix has diversified from mainly staples of grains and tubers to fruit and vegetables, vegetable oils, dairy, meat, and fish. Urban consumers increasingly consume processed foods. Some supply chains are becoming longer, linking cities to more distant farms; with improved logistics in transport, storage and handling. Supermarkets and food retail chains have become significant retailers in some cities (Reardon et al. 2015; Tschirley et al. 2015).

The evolving supply chains bring opportunity for farmers and businesses in the supply chains: indeed, the scope to create jobs with decent wages in these supply chains may be greater than in farming itself. Agro-processing may be a stepping stone on the path to developing skills in manufacturing (AfDB 2016; ACET 2017).

But they also bring challenges. To facilitate the chains, investments are needed in roads, storage, and processing plants. To supply the chains, farmers need to expand output; and, equally importantly, output of a standard to satisfy the quality demands of processors, retailers and exporters.

2.3 The commodity price spike of 2008 to 2014 and land deals

In late 2007, prices of many commodities began to rise strongly on world markets. This applied to agricultural commodities and, in particular, cereals. By early 2008, the world prices of grains had doubled or tripled (Headey and Fan 2010). Commodity prices were to stay much higher than the levels seen previously until 2014.

The sudden and large increases in world market prices had several effects on agriculture. One was the direct stimulus to farmers to increase output to take advantage of higher prices, even if the transmission of international to local prices was imperfect. Another was the response of many governments, partnered by donors and international agencies, which facilitated supply response by ensuring that seeds and fertiliser reached farmers, sometimes at subsidised cost. Not least of the effects was indirect: as oil prices surged, reaching more than US\$130 a barrel in mid-2008, interest rose in growing biofuel crops that, converted to ethanol or biodiesel, could substitute for costly oil imports (Wiggins and Keats 2013).

One consequence was that, for the first time since the early 1980s, agriculture appeared to offer high returns to investors. Moreover, the governments of some emerging economies with rising agricultural imports, mainly in Asia and the Near East, became alarmed by the higher prices on world markets, fearing that soon they might not be able to import the food they needed. Both international investors and these governments reacted by seeking land for farming, with several African countries being the targets owing to their apparent stocks of little-used potential agricultural land. The years following 2008 saw the announcement of many land deals, with investors and state agencies offered large tracts of land, often of more than 10,000 hectares (Deininger and Byerlee 2012; Cotula et al. 2014).

In the event, some of the plans for international large-scale land deals have remained as just that: plans. Even when investors have begun operations on the ground, the scale has sometimes been a small fraction of that originally contemplated. Moreover, in some cases these investments have failed, especially those where the investors planted jatropha for biofuel (Zoomers and Kaag 2014).

While the international deals made the headlines, subsequently it seems that many more land deals, affecting larger areas, have been domestic affairs. Local investors, often based in urban areas, were acquiring land, usually in smaller lots of a few hundred hectares, as business investments. Consequently, in some countries

medium-scale farms of anything between 10 and 100 hectares have been created that constitute significant shares of the total area farmed. One recent estimate is that medium farms occupy 20 percent of agricultural land in Kenya, 32 percent in Ghana, 39 percent in Tanzania and more than 50 percent in Zambia (Jayne et al. 2016). The typical investor in these countries was urban, late in life or retired, investing funds from non-farm earnings.

2.4 Environment and climate change

It is increasingly recognised that agricultural development in sub-Saharan Africa has to be environmentally sustainable; and will have to adapt to climate change. Key environmental challenges are those of avoiding soil degradation and erosion, and preventing conversion of valued habitats such as forest and wetlands to farm use (UNEP 2016). Climate change means that farmers will need to adapt, above all to more variable rainfall, temperature and storms. There is also an opportunity to mitigate global warming, if farming systems that capture more carbon in trees and the soil can be adopted.

The environment and climate change, however, get only limited mentions in the Africa-wide reviews mentioned: the *African Development Report* (AfDB 2016) has only passing references to these issues; the *Africa Agriculture Status Report 2017* (AGRA 2017) has less than five pages on them; the *African Transformation Report 2017* (ACET 2017) does have a chapter dedicated to the environment, but it is short, at less than ten pages.

It is far from clear that the environmental and climate change imperatives get the attention they need.

Processes of environmental and climate change, innovations to mitigate and adapt them, and policy priorities constitute a major topic that lies beyond the scope of this paper.

2.5 Agricultural policies and initiatives

Policies for agricultural development in most African countries have undergone very considerable changes since the 1980s. At that time, strategies for agricultural development included a leading role for the state, often operationalised through marketing boards for specific commodities that would provide farmers with inputs, technical assistance and then buy up output. Too often, the boards operated at high cost, either then penalising farmers by paying low prices or else running up large public debts (Barrett and Mutambatsere 2008). At the same time, macroeconomic policies in the 1970s often included over-valued, fixed exchange rates, high inflation and much public debt. Farmers as producers of tradable goods were disadvantaged by

these policies, since they tended to depress prices to farmers while making competing food imports cheaper (Krueger et al. 1991).

The realisation of the way that such policies often reduced incentives to farmers, at a time when agricultural growth was slow, helped make the case for structural adjustment and associated reforms that were implemented in most countries of sub-Saharan Africa during the 1980s and 1990s (Berg 1981).

By 2000, the marketing boards had been privatised, disbanded or else had their functions much curtailed; while macroeconomic distortions had been much reduced, so that the implicit taxation of African farmers had been greatly alleviated (Anderson and Masters 2009).

Moreover, the early 2000s saw a major increase in the priority given to agriculture by governments across the continent, most clearly signalled by the 2003 Maputo Declaration by Africa's ministers of agriculture. This set a target of 6 percent annual growth for agricultural output, supported by allocating 10 percent of public budgets to farming. Shortly afterwards, the Comprehensive Africa Agriculture Development Programme (CAADP) was launched to coordinate efforts to achieve those aims (NEPAD 2003).

At the same time, most donors increased their support for agricultural development that had languished in the 1990s (Eicher 2003). Since 2000, private foundations have also channelled additional finance to agricultural development, most notably the Bill & Melinda Gates Foundation. New initiatives have been started, including the Alliance for a Green Revolution in Africa (AGRA), the Forum for Agricultural Research in Africa (FARA), and the New Alliance for Food Security and Nutrition. These initiatives channel investments in agriculture, raise awareness of the issues, and help coordinate the activities of governments, donors, NGOs and the private sector.

Investment by governments, donors and foundations has tended to focus on stimulating production and supply through adoption of improved technology (Diao et al. 2013). Where formerly the public sector was expected to lead, most countries have moved to seeing the private sector as a key actor, where government supports private initiatives.

Despite reforms and renewed priority to agriculture, policies remain imperfect. In their review of input use, Sheahan and Barrett (2014) conclude:

Although biophysical, demographic, and socioeconomic variables matter, national-level factors explain nearly half of the farm-level variation in inorganic fertilizer and agro-chemical use, underscoring the critical importance of the policy and institutional environment for ushering in a Green Revolution in Africa.

Angelucci et al. (2013) report on the Food and Agriculture Organization of the United Nations's (FAO) analysis, through the Monitoring and Analysing Food and Agricultural Policies (MAFAP) programme, of food and agricultural policies for 2005 to 2011 in ten countries: Burkina Faso, Ethiopia, Ghana, Kenya, Malawi, Mali, Mozambique, Nigeria, Tanzania and Uganda.

Farmers in these countries, Angelucci et al. (2013) report, have often seen prices for their output depressed, owing in large part to limitations in value chains such as roads, other infrastructure, organisation and articulation of chains, information asymmetries, and monopoly power. But they also report the disincentives arising from currency overvaluation, and policies to protect consumers such as reduced import tariffs during the 2007/08 food price spike.

Support for farmers has tended to be provided in the form of input subsidies, rather than improvements to roads and research efforts. Governments have increased their shares of spending on agriculture, but often that has meant more agriculture-specific spending, such as subsidies, rather than spending on public goods for rural development (Angelucci et al. 2013).

Observations of the divergence between policies and investments that have been tested and proved to be effective, above all spending on public goods in rural areas, and those that many leaders prefer such as subsidies, has prompted much enquiry into the reasons for policy choices – see, for example, Booth et al. (2014); Henley and van Donge (2012); Poulton (2014). These analyses, while rich in insights about specific policy choices, do not arrive at a general explanation. Two themes, however, emerge reasonably clearly.

One is that of the struggle to control the state and economy in low-income countries with limited state capacity; where leaders are tempted to squeeze resources from economic activity by which to reward political supporters. Those supporters, lacking faith that the state could use those resources for longer-run productive investment, then expect their rewards in highly visible pay-offs in the short run. For agriculture, a fertiliser subsidy thus looks much more attractive

politically than investment in agricultural research, or even in rural roads. This analysis thus tends to see African countries trapped politically into making poor use of the few revenues that the state has, thereby exacerbating the initial conditions that led to poor choices.

The other theme, much inspired by interpretations of Asian political economy, stresses the way that political settlements may be reached by leaders and elites, where the state eschews hand-outs in favour of strategic investment to support economic growth. Much depends on ideas that inspire the settlements, and the leaders who broker them.

In both sets of ideas, changes are often incremental, rather than revolutionary. Leaders and elites may take some small steps in a particular direction, which if successful, may then encourage further incremental changes. These more recent analyses of the political economy of agricultural policy choice are more optimistic than those seen in the past; yet they do not generate simple, widely-applicable lessons. The interplay in politics between ideas, leadership, and the ways in which individuals and groups seek power remains complex, heavily rooted in local history and circumstances.

3. AGRICULTURAL DEVELOPMENT SINCE 1990

This section examines growth of agriculture and its productivity since 1990, set within the context of economic growth and structural change. It draws on officially-reported national-level statistics.

Where possible, statistics have been computed for all of Africa, for selected regions, and for selected countries. To capture regional trends, three of the five UN regions⁸ – Eastern, Middle, and Western – have been used, since these make up most of sub-Saharan Africa. The main omissions from usual definitions of sub-Saharan Africa are Sudan, which the UN considers to be part of Northern Africa; and the five countries of Southern Africa that are members of the Southern African Customs Union (SACU). The latter are omitted because statistics for the region are overwhelmingly dominated by those of South Africa, where agriculture differs considerably from that of most other parts of sub-Saharan Africa.

Statistics are also given for some individual countries, for two reasons. One is that some regional aggregates are dominated by unusually large countries within them, so that changes in other countries of the region can be obscured by those of the dominant country. Nigeria, for example, is so much larger than other countries in Western Africa. The other is that continental and regional statistics often mask significant variations from continental and regional trends. Twelve countries have been selected to capture some of the country variations. They include the ten countries that signed up to the New Alliance for Food Security and Nutrition: Benin, Burkina Faso, Côte d'Ivoire, Ethiopia, Ghana, Malawi, Mozambique, Nigeria, Senegal and Tanzania. To these have been added two countries on which the APRA consortium focuses but which did not join the New Alliance initiative: Kenya and Zimbabwe. The populations of these 12 countries in 2015 made up 45 percent of the population for Africa as whole, and 59 percent of the population of Eastern, Middle and Western Africa.

Data reliability

National statistics on agriculture in Africa – areas cultivated and grazed, number of livestock, amounts produced, labour employed, inputs used, etc. – are

weak. In most cases, they do not come from systematic measurement; but rather from assessment by local specialists, such as district agricultural officers, based on visual inspections, discussions with farmers, and so on. It is hard to know just how reliable they are; but FAO rates only two out of 44 countries in sub-Saharan Africa as having high standards of data collection (quoted in Carletto et al. 2015).

Statistics for regions, or the whole of Africa, moreover, need to be treated with much caution since some large countries, such as the Democratic Republic of the Congo, probably have very weak statistics.

Furthermore, it is difficult to corroborate agricultural production data. One ready proxy, the level of agricultural imports, is not as strong as might be imagined: rising agricultural imports can be as much a sign of economic success as the consequence of insufficient domestic production.

That said, when trends at national level are similar across countries, this may give some confidence that they are real, and not just the result of poor measurement.

More reliable insights into changes in farming for much of Africa might be obtained from two sources: small-scale surveys of households in villages and districts; and the Living Standards Measurement Surveys (LSMS) with Integrated Survey on Agriculture (ISA) household surveys. Even then, the former surveys are usually one-off observations that do not measure change over time, while the latter were started very recently – the earliest rounds took place in 2010 – and cover just eight out of 55 countries in Africa. Furthermore, most such surveys rely on farmer estimates and recall, rather than direct measurement of areas cultivated, produce harvested, and so on.

Before reviewing the agricultural record in Section 3.3, sections on economic growth and structural change, and population change set the context.

3.1 Economic growth and structural change

In absolute terms, economic growth in sub-Saharan Africa since 1990 has been moderately strong: an annual average increase of 4.5 percent (Figure 1a). That is slightly faster than the growth seen in East Asia and the Pacific over the same period; although less than that seen in South Asia. Some of the 12 selected countries saw rapid growth: Burkina Faso, Ethiopia, Ghana, Mozambique, Nigeria and Tanzania all grew at more than 5 percent a year.

Economic growth per person in sub-Saharan Africa, however, was much less, owing to rapid population increases (see Section 3.2). The average was a more modest 1.8 percent a year from 1990/92 onwards. That, however, was a major improvement on economic growth per person in the 1980s that averaged minus 1.6 percent a year. But per person, sub-Saharan Africa's return to growth since 1990 has lagged well behind that seen in East and South Asia.

The fastest growing national economies, however, have seen growth per person of more than 2.5 percent a year, sufficient to double incomes in less than 30 years. Burkina Faso, Ethiopia, Ghana, Mozambique, Nigeria and Tanzania make up this group. Qualifications, however, apply in several cases. Ethiopia's very rapid growth comes from a very low base. Ghana's recent growth owes something to a revaluation of the GDP, a factor that applies all the more so to Nigeria. Mozambique's rapid growth comes largely from some

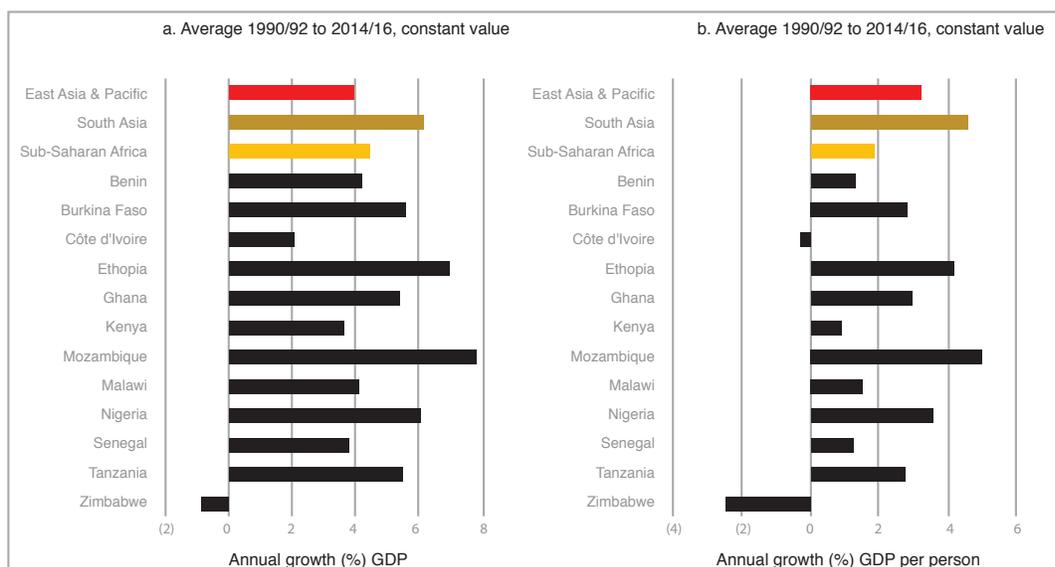
mining and associated processing plants, such as the giant Mozal aluminium plant.

Economic growth in sub-Saharan Africa has been notably stronger since 2000 than in the 1990s: for sub-Saharan Africa, the average annual growth of GDP per person was just 0.03 percent a year in the 1990s, but 2.5 percent a year since 2000. Eight of the 12 have seen faster growth since 2000 than before.

Economic structures have changed since 1990 as well. Agriculture's share of GDP has fallen, with most of the selected countries seeing agricultural shares of 30–45 percent in 1990 drop to 20–35 percent by 2015. As agriculture's share of GDP has fallen, in most countries services have gained share, but industry less so (Figure 2). Indeed, industry's share in the mid-2010s has been relatively small, in most cases making up 20–25 percent of GDP, and has generally only increased its share of GDP a little since 1990. 'Industry', moreover, captures not only manufacturing, but also mining, construction, and the utilities of electricity, gas and water, in addition to manufacturing.

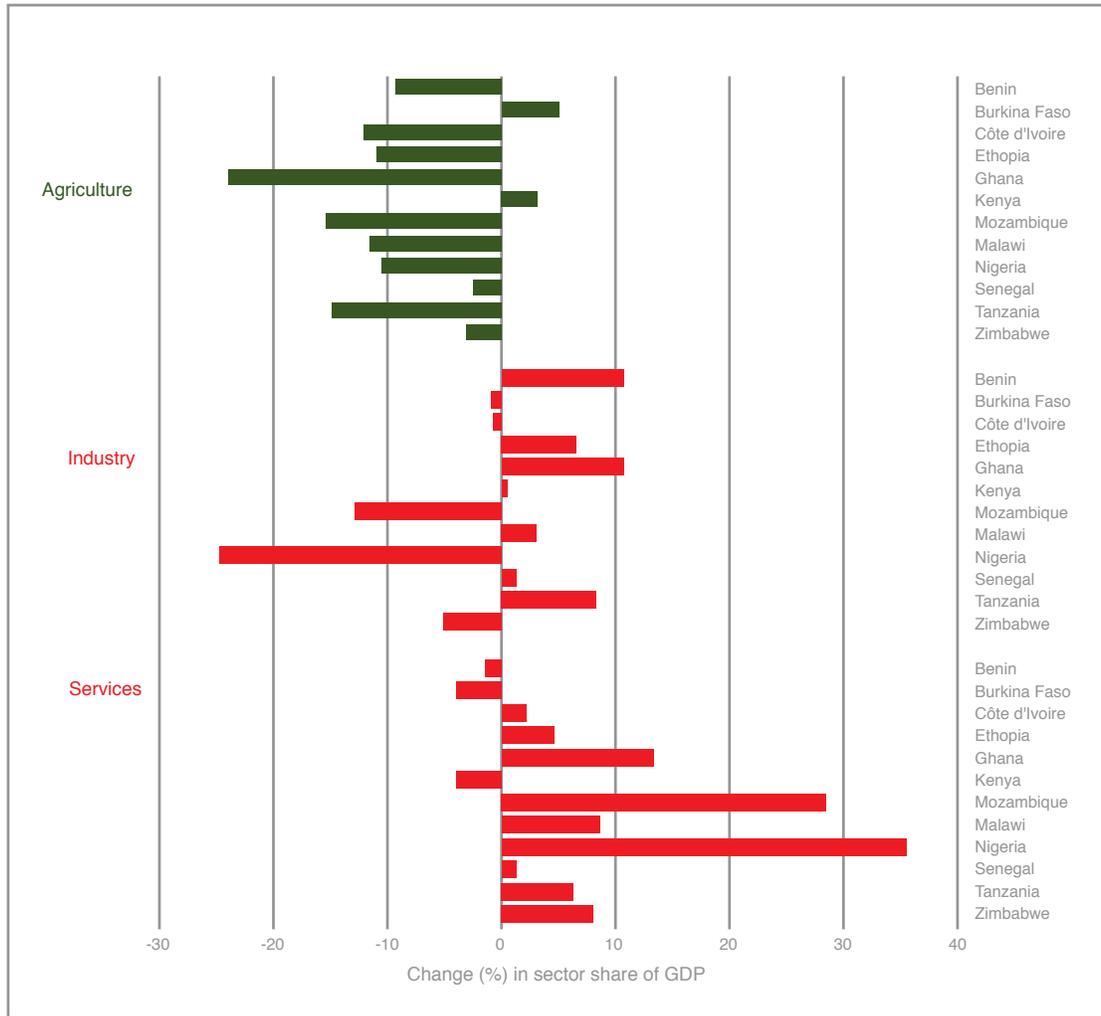
Manufacturing makes up a significantly smaller share of output in the 12 countries, lying in a range from 5 percent to 15 percent of GDP. Moreover, in almost all cases – Benin and Nigeria are the only exceptions – its share has actually declined since 1990 (Figure 3). For those concerned that Africa is not seeing the kind of economic growth that leads to innovation and skilling of the workforce, where manufacturing can play a central role, these are telling and worrying statistics.

Figure 1 Economic growth, sub-Saharan Africa and selected countries, 1990 to 2015



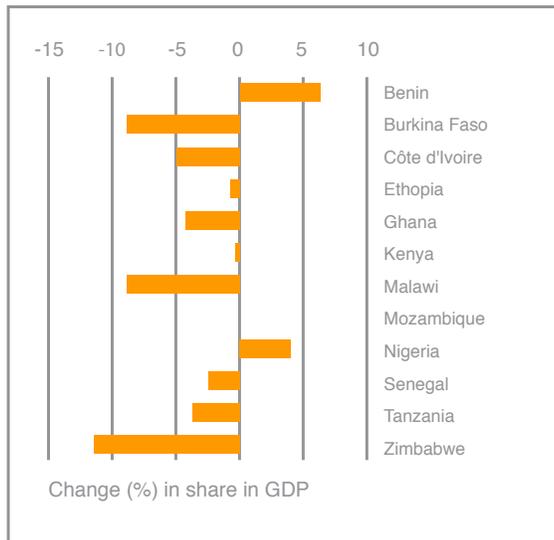
Source: Author's own, compiled from data in World Development Indicators, World Bank.

Figure 2 Changes in the share of GDP from different sectors, 12 countries, 1990 to 2015



Source: Author's own, compiled from data in World Development Indicators, World Bank.

Figure 3 Manufacturing's share of GDP, 12 countries, 1990 to 2015



Source: Author's own, compiled from data in World Development Indicators, World Bank.

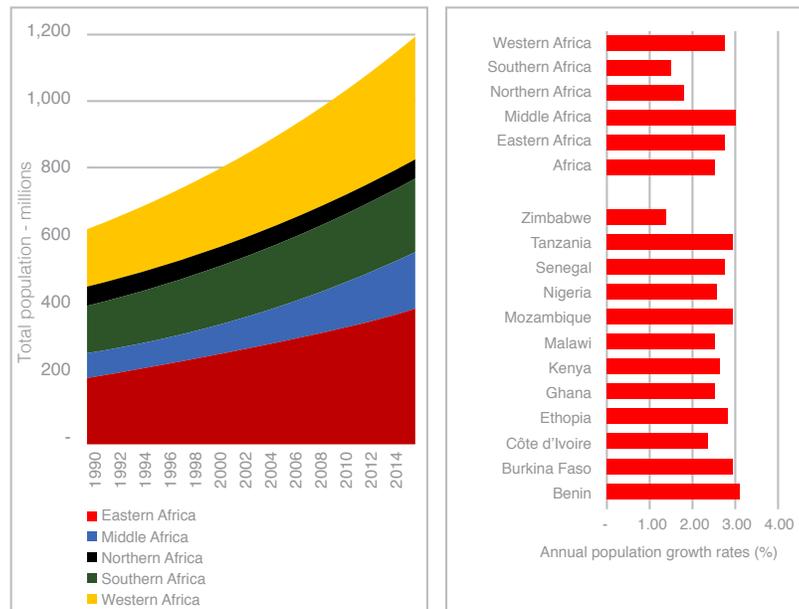
3.2 Population growth

Total population has grown rapidly across the continent since 1990: for Africa as a whole, at a rate of 2.5 percent a year. Total population has thus almost doubled from 1990 to 2015 (Figure 4). Of the 12 countries, only one – Zimbabwe – has seen population growth of less than 2.5 percent a year; and Benin, Burkina Faso, Mozambique and Tanzania have seen their populations grow at close to 3 percent or more. While a rising population can contribute to economic growth, such rapid growth puts a heavy load on education and health services. Rural populations across much of Africa are growing less rapidly, but growth is still quite strong with an

overall Africa rate of 1.9 percent a year from 1990 to 2015 – except for Southern Africa where the rural population has grown only minimally since 1990 (Figure 5). Since 1990, almost 250 million persons have been added to the rural population of Africa, so that by 2015 there were almost 700 million living in rural Africa. In two regions, Middle and Eastern Africa, and in several of the 12 countries, the rural population has been growing at more than 2 percent a year.

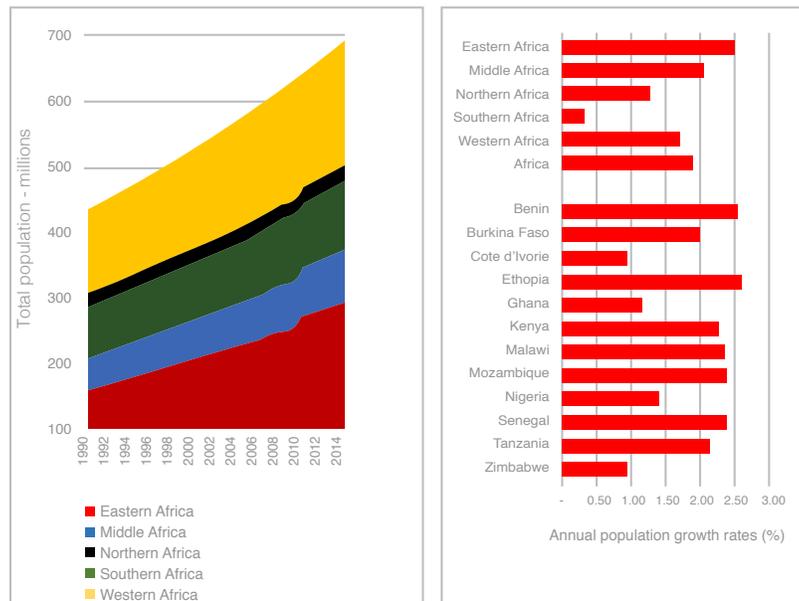
This is transforming rural Africa: 50 years ago, most of the countryside was lightly settled – with less than 50 persons per square kilometre, allowing most farm households to expand their fields should they have

Figure 4 Population growth, Africa, 1990 to 2015



Source: FAOSTAT.

Figure 5 Rural population growth, Africa, 1990 to 2015



Source: Author's own, compiled from data in World Development Indicators, World Bank.

the labour to do so. Today, however, the combination of the steady build-up in numbers and the tendency of populations to concentrate on reasonably good agricultural land – in 2013 it was estimated that 57 percent of the rural population of sub-Saharan Africa lived on just 10 percent of the land (Chamberlin et al. 2014) – means that 76 percent of rural Africans were living at densities of 238 per square kilometre or more. At that density, if households had on average five persons, the average family farm holding would at most measure just over two hectares – assuming, rather optimistically, that all the land was cultivable. The land frontier in most such areas would then probably be closed.

Rural population growth is slowing, but only gradually: in 1990 the median annual growth for the 12 countries was 2.6 percent; by 2015 it was just under 2 percent a year. With such slow deceleration, it seems likely that substantial increases in the rural population will be seen over the next two decades or longer.

3.3 Agricultural growth

3.3.1 GROWTH OF OUTPUT

The value of agricultural output, in constant terms, for Africa more than doubled between 1991 and 2013, growing by an average of 3.3 percent a year (Figure 6a). This rate is similar to that seen in East and South Asia over the same period, but 0.6 percent a year slower than growth in South Asia.

Differences across regions and countries are marked. Middle and Eastern Africa registered growth rates greater than those seen in Southeast Asia. Even larger increases were seen among the 12 countries. Four countries more than tripled the value of their output: Ethiopia, Malawi, Mozambique and Tanzania. Contrarily, output in Zimbabwe actually fell over the two decades.

What would otherwise be quite impressive increases in agricultural output in Africa, however, are much less so when compared to population growth (Figure 6b). For the continent as a whole, output per person rose by just 0.73 percent a year on average since the early 1990s, just 17 percent in all. This rate is less than one third of that seen in Southeast Asia and less than one quarter of that seen in East Asia. Africa's high rates of population growth, much faster than those seen in Asia, have a marked effect on production per person.

Some parts of Africa registered a fall in output per person: Middle Africa, Senegal and Zimbabwe. Several countries, however, saw sufficient growth to increase output per person by more than 30 percent: Benin, Ethiopia, Ghana, Malawi, Mozambique and Tanzania.

Comparing the value of agricultural output per person in Africa to levels seen in Asia (Figure 6c), for the most recent data of 2012/14, the continental average

Figure 6a Annual average growth of agricultural output, 1990/92 to 2012/14

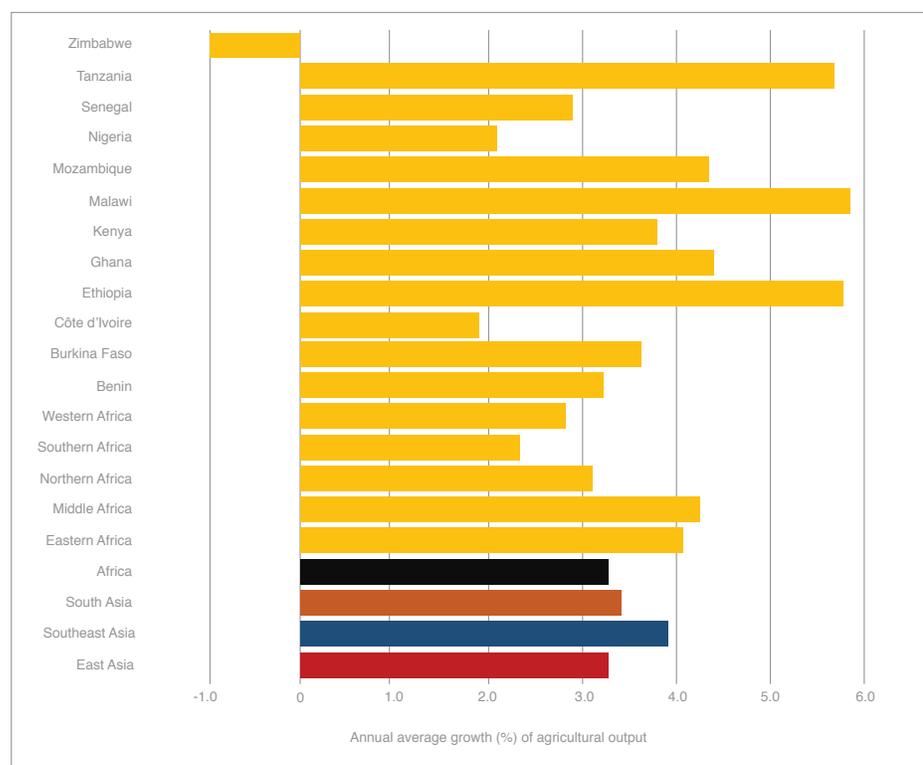


Figure 6b Annual average growth, per person, of agricultural output, 1990/92 to 2012/14

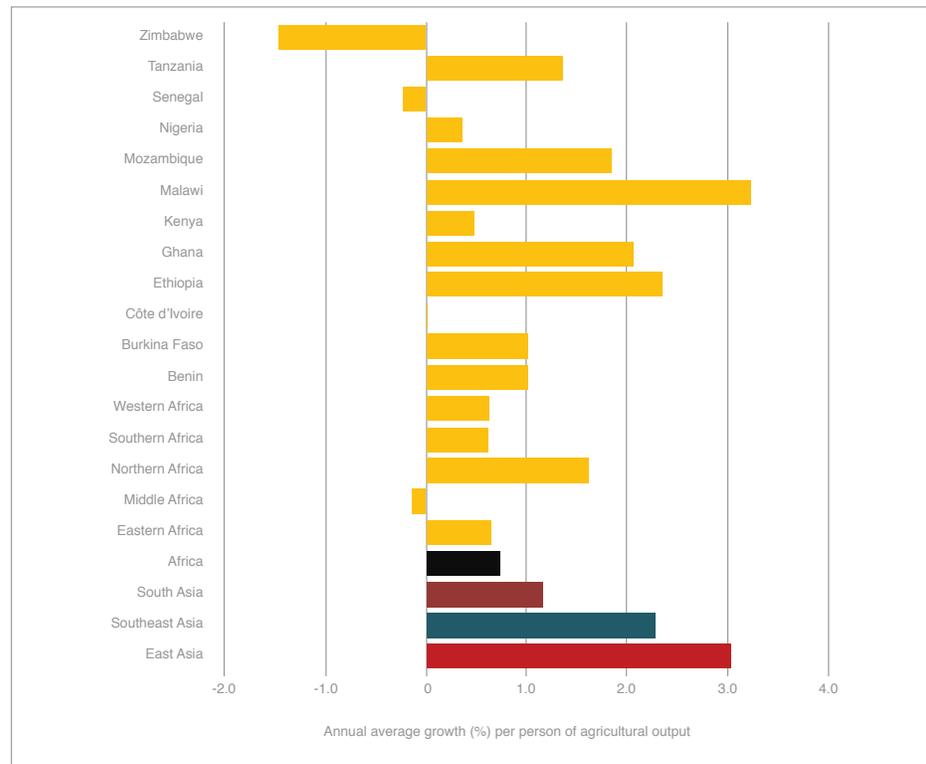
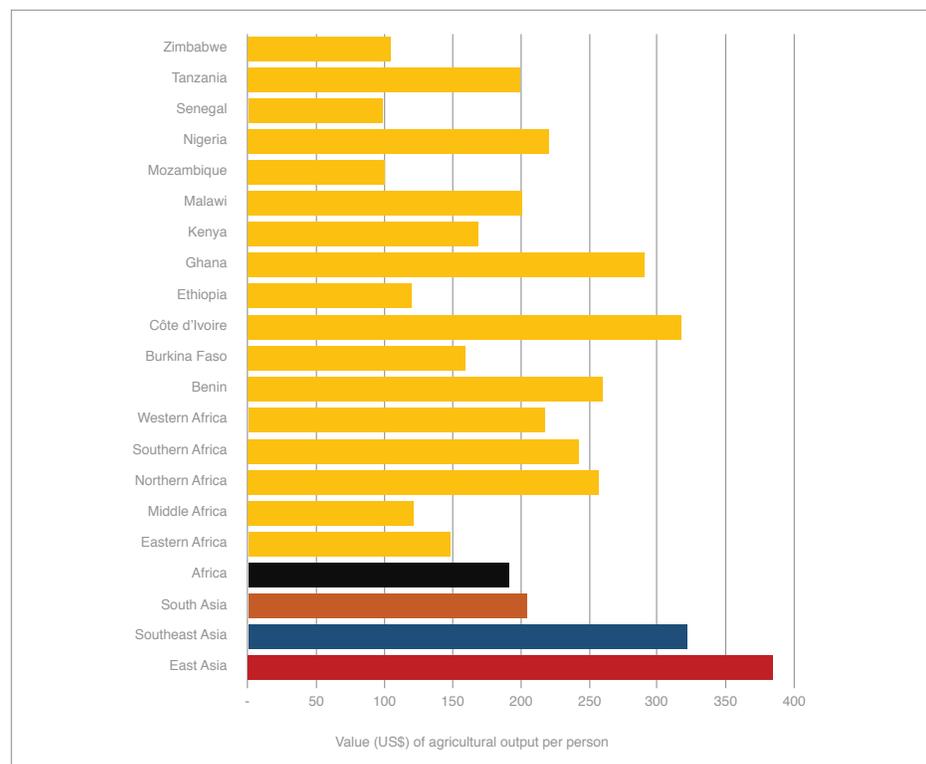


Figure 6c Value (US\$) of agricultural output per person, 2012/14, constant US\$ 2004/06



Sources: Author's own, compiled from FAOSTAT data, using gross value of agricultural output in constant terms, 2004/06 price levels. Since the same values are applied to produce in any year, this calculation is unaffected by price changes.

of US\$191 is about half the level seen in East Asia (US\$385), well behind that of Southeast Asia (US\$321), but only slightly less than Southern Asia (US\$204). Considerable variations can be seen within Africa, with the Côte d'Ivoire and Ghana having output per person close to the average for Southeast Asia. Many countries in Africa, and the Eastern and Middle Africa regions, however, produce less than US\$150 per person. Agricultural growth seen since 1990 has, in many areas, been from a low base.

3.3.2 RESOURCE USE AND AGRICULTURAL PRODUCTIVITY

Area under arable and permanent crops

Large areas of land have been added to arable and permanent crops in Africa since the early 1990s. In total, some 68 million hectares were added from 1990 to 2015, taking the area under crops from 204 million to 272 million hectares, an increase of 31 percent (Figure 7).

This contrasts with East and South Asia where over the same period, the area to crops actually reduced. Southeast Asia, however, saw its cropped area increase

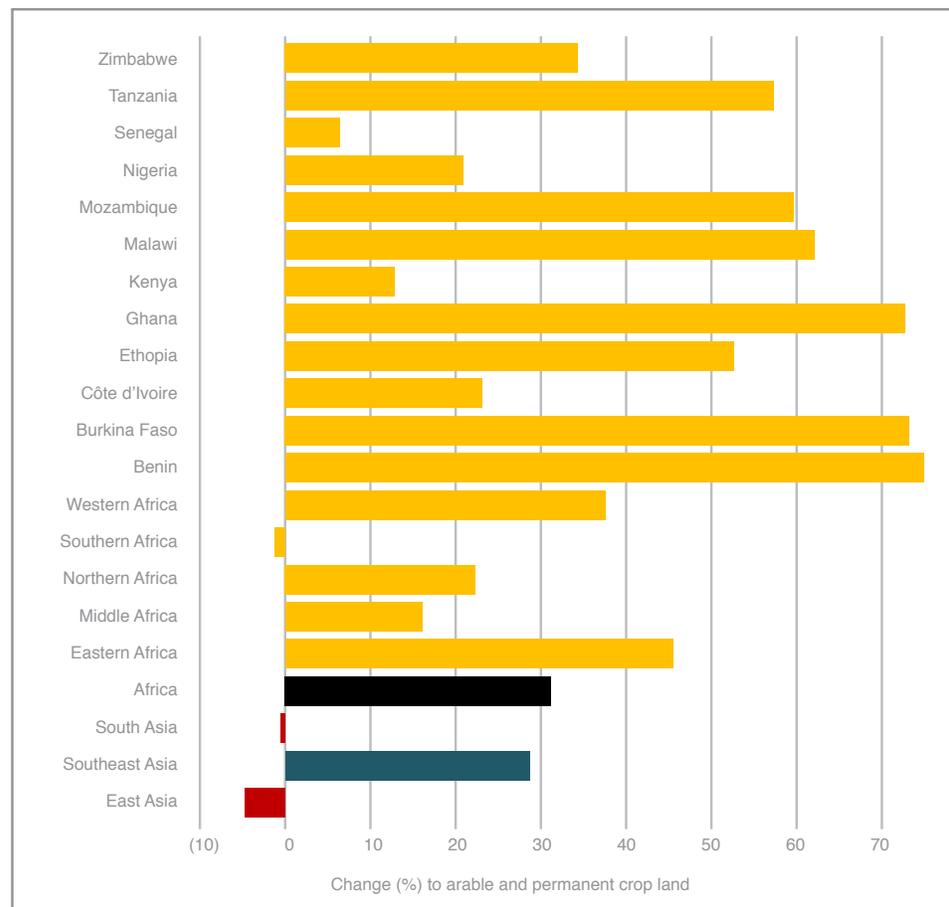
by a similar fraction to Africa: 28 percent.

Much variation in additions to land under crops can be seen across the regions and countries of Africa. Several countries have added 50 percent or more to their cropped area since the early 1990s, including Benin, Burkina Faso, Ethiopia, Ghana, Malawi, Mozambique, Tanzania and Zimbabwe. Contrarily, only small areas have been added in Middle Africa, Kenya and Senegal; while Southern Africa has actually seen a contraction of the cropped area.

Little correspondence can be seen between the increased area registered, and the availability of potential agricultural land. Middle Africa and Côte d'Ivoire, for example, have considerable uncultivated areas that might be farmed. Northern Africa and Malawi, in contrast, have limited spare land, yet have managed to add considerably to the area under crops.

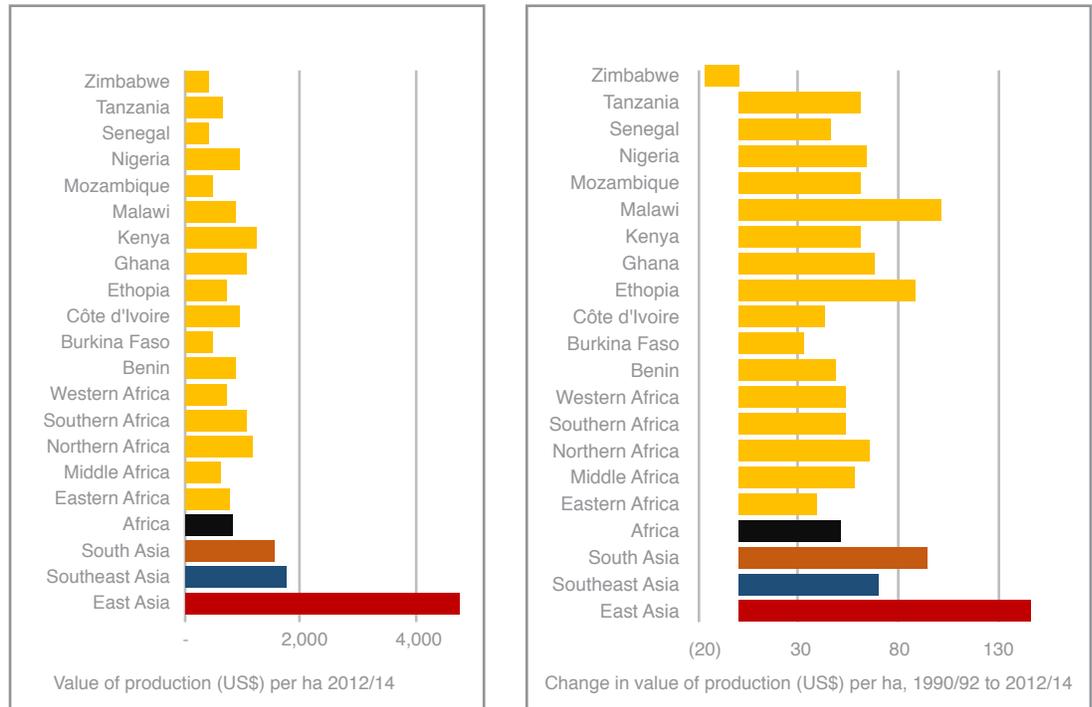
For most of Africa it seems that much of the increased output since 1990 has come from increasing the area under crops. That prompts the question of whether productivity of land has risen, or whether increased output results from extension of the area under crops.

Figure 7 Change to arable and permanent crop land, 1990/92 to 2013/15



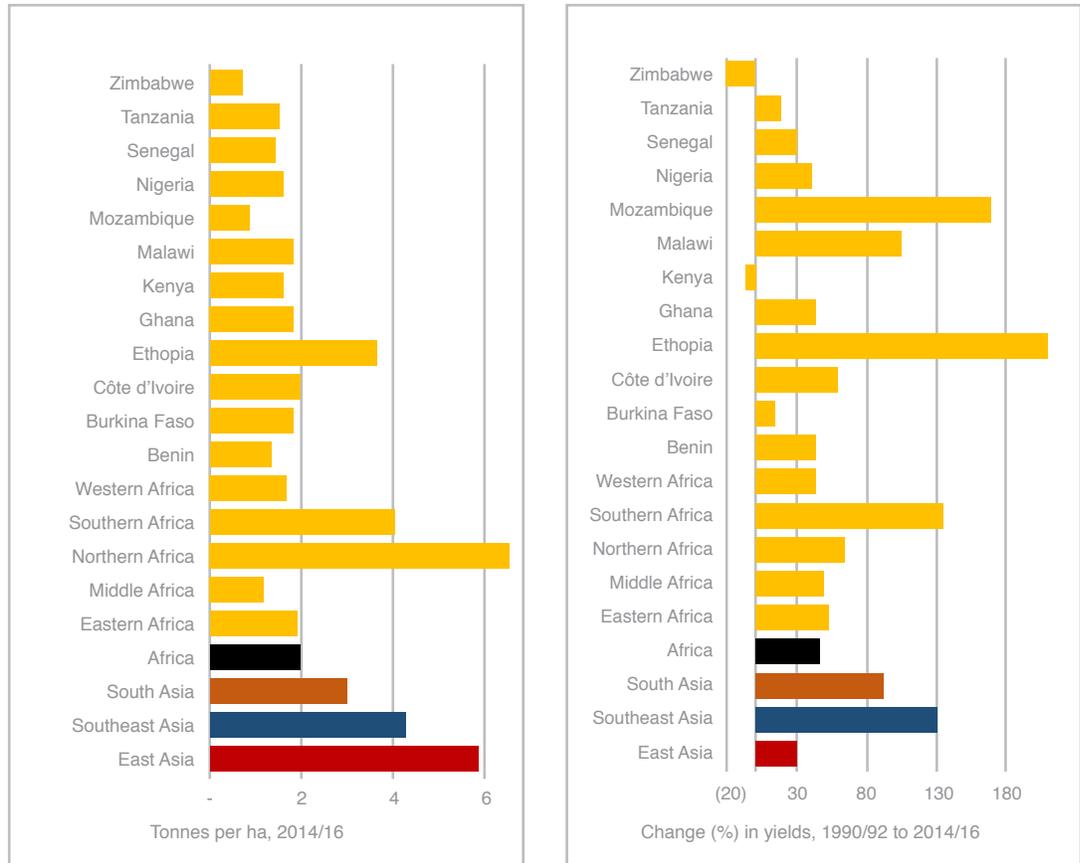
Source: Author's own, compiled from FAOSTAT data.

Figure 8 Land productivity changes, 1990/92 to 2012/14



Source: Author's own, compiled from FAOSTAT data.

Figure 9 Maize yields, 1990/92 to 2014/16



Source: Author's own, compiled from FAOSTAT data.

Land productivity

Land productivity, measured as the value of production per hectare of arable and permanent crops⁹ is low across most of Africa, generating less than US\$800 (2004/06 values) per hectare in 2012/14 (Figure 8). This is much lower than levels seen in Asia: less than half what is obtained in South Asia, and less than one fifth of East Asian land productivity.

That said, land productivity has risen across much of Africa since the early 1990s: by 51 percent for the continent as a whole. That is considerable, even if not as much as seen in Asia over the same period where productivity has risen by 70 percent or more. Within the selected countries, the largest increases were seen in Malawi (102 percent) and in Ethiopia (89 percent).

Land productivity in the aggregate is a little abstract: much of the debate on land productivity has evidence cited on the yields of key crops, usually cereals. Cereal yields are particularly interesting, given the efforts to stimulate a green revolution in Africa. Maize is the most commonly cultivated cereal in Africa. In 1990/92, typical yields across much of Africa were scarcely more than 1.5 tonnes per hectare. By 2014/16, they

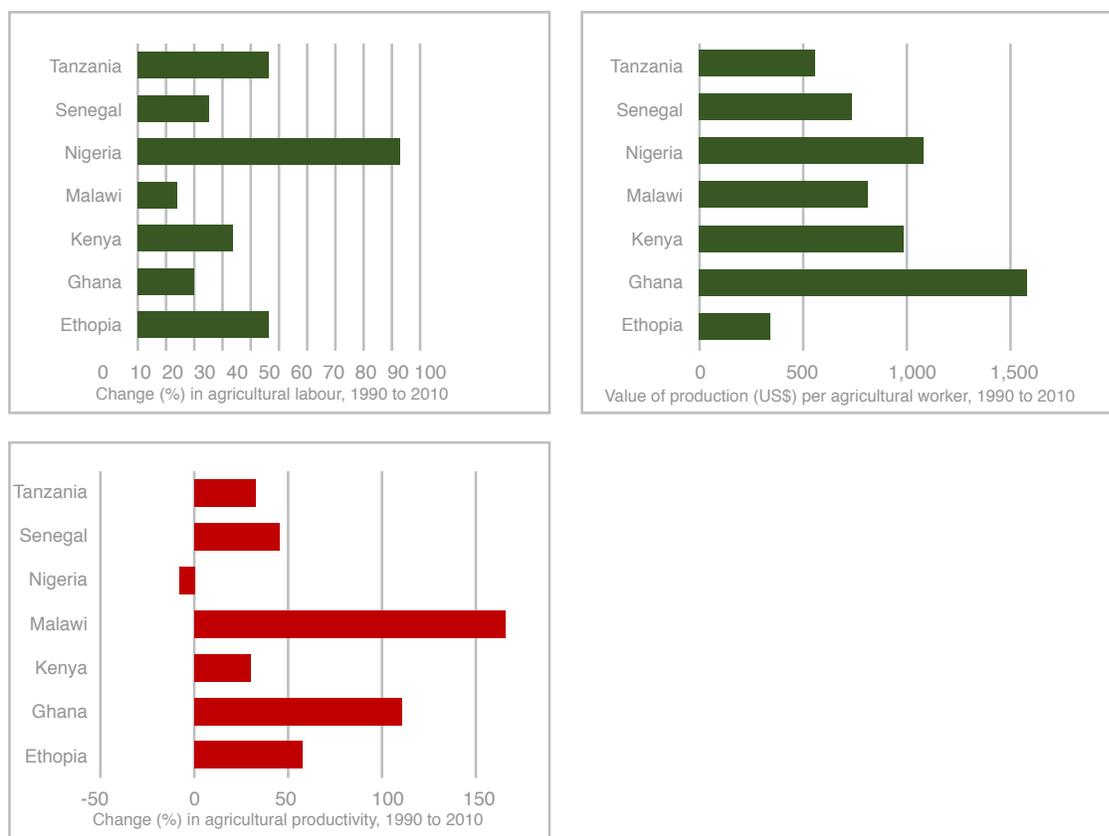
were just above 2 tonnes per hectare, a 46 percent improvement (Figure 9). This increase is very similar to that for the improvement in overall land productivity. Therefore it seems that fears of there being few gains in yields, or in the intensity of crop farming in Africa in the last 25 years, are exaggerated.

Yields were, however, much less in 2014/16 than those seen in Asia: Africa's average of 2 tonnes can be compared to that of almost 6 tonnes for East Asia. As is often commented, cereal yields across much of Africa are well below what might be achieved by using improved seeds, fertiliser and crop protection (Nin-Pratt et al. 2011). Moreover, the yield gains for maize seen across Africa since 1990 have, for most regions and countries, been less than those seen in South and Southeast Asia; although more than the gains in East Asia that already had high yields in the early 1990s.

Across the continent considerable variation can be seen. Since the early 1990s, yields have doubled or more for South Africa, and for Malawi, Mozambique and Ethiopia.

For paddy rice yields (see Annexe B) the picture is similar: Africa has seen gains since the early 1990s,

Figure 10 Agricultural labour productivity, 1990 to 2010, selected countries



Source: Author's own, compiled from FAOSTAT and from data in GGDC (Timmer et al. 2015).

but not as great as those seen in South and Southeast Asia. Rice yields in 2014/16 in Africa, an average of just over 2.5 tonnes per hectare, remain at half or less of the levels seen in parts of Asia.

Agricultural labour productivity

It is difficult to measure agricultural labour both practically and conceptually. Practically, unless farmers keep daily diaries, asking them to recall just how long they have spent on their different crops and livestock is fraught with problems.

Conceptually, many of those working on farms do so part-time, seasonally and with varying lengths of working day. Hence, it is difficult to state a precise number for the agricultural workforce, without these considerable qualifications. Ideally, statistics on the number of hours spent working in agriculture would be available, but collecting them would be onerous.

FAO used to provide estimates of the economically active population engaged in agriculture, but no more: instead it reports results from labour surveys, but coverage is incomplete and some of the results reported are hard to believe. The labour data estimates used here come from the Groningen Growth and Development Centre,

but are only available up until 2010, for seven of the 12 countries, and none for the regions of Africa.

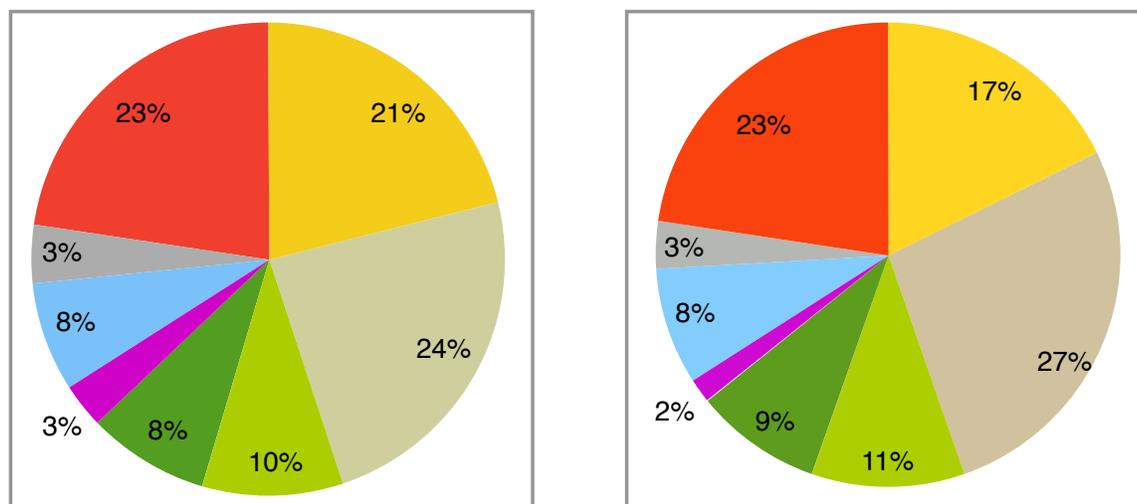
Using these data, increases in labour on farms since 1990 lie between 20 percent and 50 percent for most countries, except for the near doubling reported for Nigeria (Figure 10a).

These data may be used to look at changes in farm labour productivity in the seven countries (Figure 10b, Figure 10c). The value produced by the average agricultural worker in 2010 varies considerably, from Ethiopia's US\$337 to Ghana's US\$1,590. Between 1990 and 2010, most countries saw increases in the range of 30 percent to 60 percent greater labour productivity, except for Ghana and Malawi where labour productivity more than doubled, and Nigeria where labour productivity actually fell slightly.

Composition of agricultural output

A further indication of transformation of agriculture is composition of output, where one might expect to see a move away from production of staples to higher value farm produce. Since the early 1990s, however, the composition of farm output for Africa as whole has changed only a little (Figure 11): staple crops of cereals,

Figure 11 Composition of agricultural output, Africa, 1990/92 and 2011/13



Composition of agricultural output, 1990/92

Composition of agricultural output, 2011/13

- Cereals
- Roots and tubers, incl. banana, plantain
- Fruits
- Vegetables
- Beverages, fibres and other non food
- Pulses and oilseeds
- Other crops
- Livestock

Source: Author's own, compiled from FAOSTAT data.

and roots and tubers made up 45 percent of output then, 44 percent in 2011/13. An intriguing shift can be seen among the staples, where the share of roots and tubers has increased at the expense of cereals. Several parts of Africa have reported large increases in cassava since the 1990s, for example in Ghana, Malawi and Senegal.

Only very small increases, if any at all, can be seen for the shares of higher value produce, such as fruit and vegetables, the shares of which rose slightly from 18 percent to 20 percent.

The very small share of output made up of beverages, fibres and other non-food crops is perhaps surprising: many of the traditional export crops are contained within this category. This may, however, reflect that crops such as tea, coffee and cocoa can only be grown with acceptable yields in relatively small agro-ecological zones. In continental statistics they appear small, but locally they can be important.

3.4 Agricultural trade

Trade statistics are relatively reliable since most goods formally traded¹⁰ are recorded shipment by shipment. Africa as a whole runs a deficit on agricultural trade, and one that is widening. In 1990 it was US\$5.7 billion in deficit: by 2013 that had deepened to US\$37 billion, in constant 2010 US dollars. Only two regions ran a surplus: Eastern and Southern Africa. In truth, however, the vast bulk of the deficit comes from Northern Africa, where the 2013 difference between imports and exports was US\$28 billion. Looking only at sub-Saharan Africa, the agricultural trade balance worsened from a surplus of US\$2.4 billion to a deficit of US\$9.5 billion between 1990 and 2013.

The rather alarming agricultural trade gap has not resulted from stagnating exports: on the contrary, exports since the early 1990s have increased notably. For sub-Saharan Africa, the value of agricultural exports in 1990/92 averaged US\$14 billion (constant 2010 value): by 2011/13 the value had increased to US\$34 billion, almost 2.5 times more.

The gap has widened, then, owing to an even larger rise in agricultural imports. For sub-Saharan Africa these imports rose from US\$13 billion to US\$44 billion between 1990/92 and 2011/13; almost quadrupling in value.

Somewhat surprisingly, given the regional and continental trade deficits, for the 12 selected countries, only four ran an agricultural trade deficit in 2012: Benin, Nigeria, Senegal and Zimbabwe. Trade balances

may, however, be worsening even in countries with an agricultural trade surplus. Only for Burkina Faso, Ethiopia and Mozambique did increases in the value of exports outstrip increases in the value of imports since the early 1990s.

The share of Africa's output that is traded has been rising. For exports, the shares of agricultural produce exported rose in almost all cases from the early 1990s to the present (Figure 12a), with Middle Africa and Malawi as exceptions where the share has declined. The very high shares shown for Côte d'Ivoire and Zimbabwe are not credible, and are most probably explained by underestimates of the denominator, production value.

The value of agricultural imports compared to the value of domestic production has also risen in almost all cases (Figure 13b). In most of the 12 countries, the shares are quite modest: 15 percent to 40 percent of the value of domestic production in 2012. Senegal and Zimbabwe, however, have very high levels of imports.

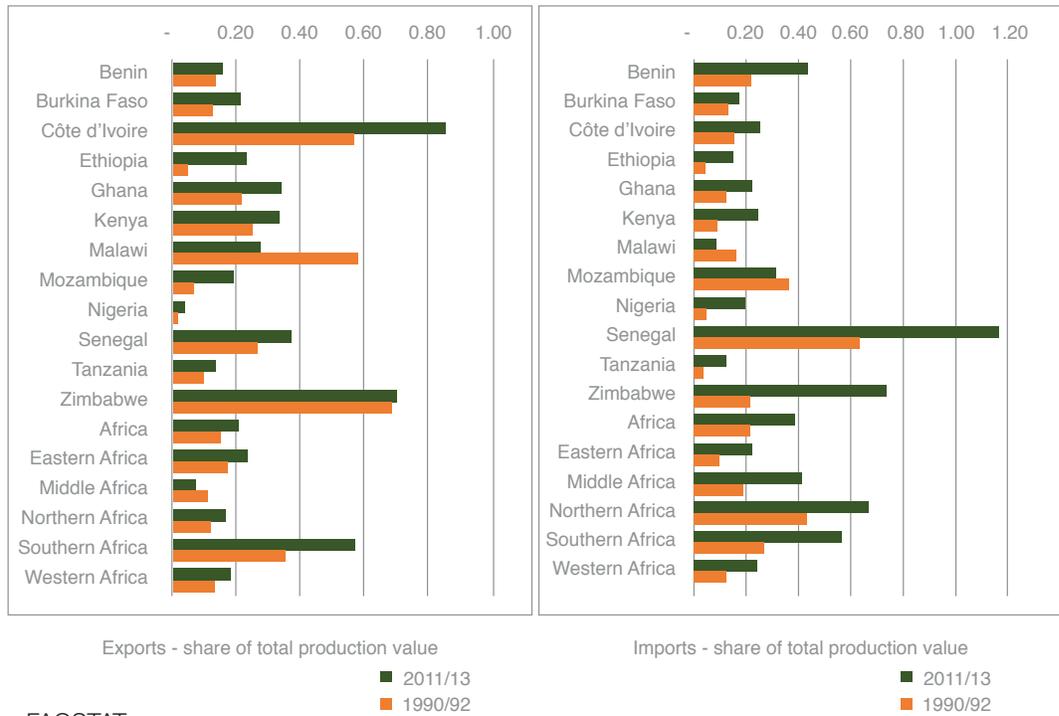
Two regions stand out for larger-scale imports: Northern and Southern Africa. Given that the Northern African countries are wealthier than most in sub-Saharan Africa, as is South Africa and its SACU neighbours that make up Southern Africa, this suggests that agricultural imports are as much a sign of prosperity as domestic agricultural failure. Northern and Southern Africa import more, simply because they can afford to do so.

A particular concern is the ability of Africa to produce its own staples. Cereals imports for all of Africa have indeed risen steeply, from 28 million tonnes in 1990 to 75 million tonnes in 2013. More than half of that quantity, 40 million tonnes, was however destined for Northern Africa.

Comparing cereals imports to population (Figure 13a), Africa as a whole imported 70kg of cereals per person in 2012, up from 50kg in 1991. That disguises some stark differences across regions and countries. While recent cereals imports surpass 190kg a person in Northern Africa, in Eastern and Middle Africa they are less than 30kg a person, and less than 50kg in Western Africa. Among the 12 countries, Benin, Côte d'Ivoire, Senegal and Zimbabwe stand out for notably high cereals imports per person. In most of the rest, imports are less than 50kg a head.

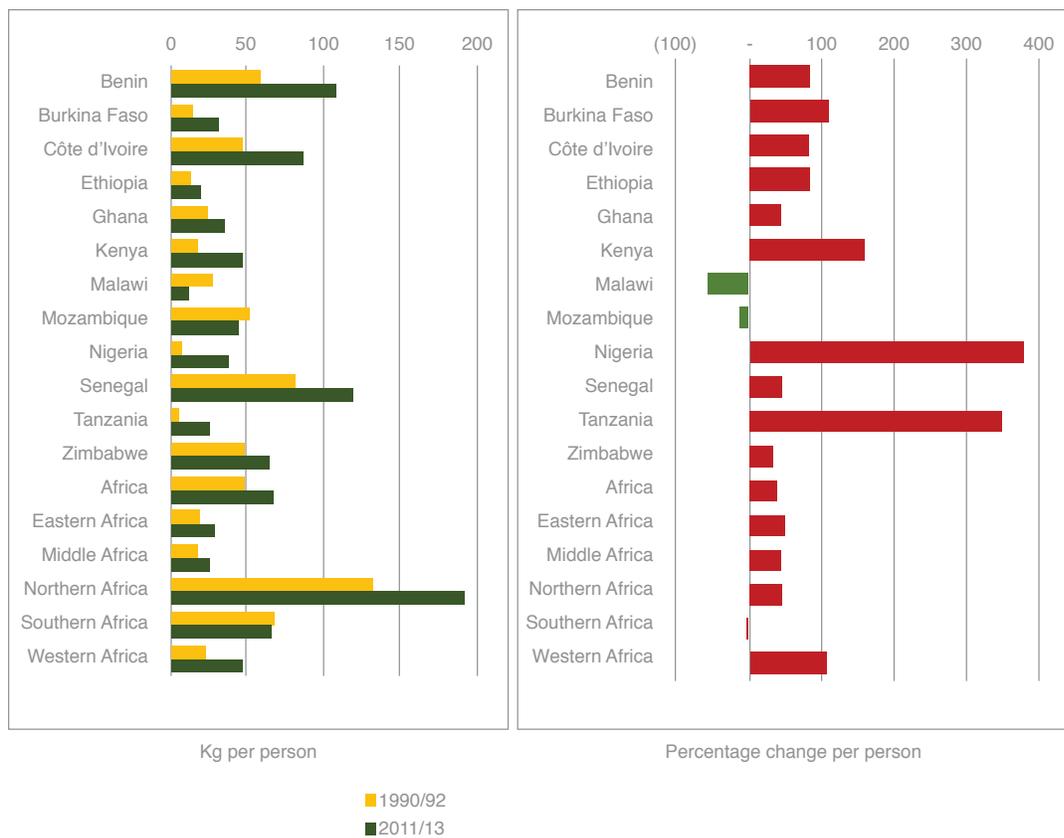
That said, most countries have considerably increased their cereals imports per person since the early 1990s, often doubling or more: indeed, only Malawi, Mozambique and Southern Africa have reduced cereals imports per person.

Figure 12 Agricultural exports and imports, as a share of total production value, 1990/92 to 2011/13



Source: FAOSTAT

Figure 13 Cereal imports per person, 1990/92 to 2011/13



Source: Author's own, compiled from FAOSTAT data.

A major part of cereals imports to sub-Saharan Africa is made up of more than 8 million tonnes of rice into Western Africa: an amount that has risen by almost four times since the early 1990s. In most parts of Western Africa, these imports are a superior good, rice being preferred by those with sufficient budgets to local alternatives of cassava, yam, millet and sorghum. While these imports may reflect urbanisation and rising incomes, the opportunity for local production to substitute for most of them has not yet been taken up.

3.5 Poverty and nutrition

To assess whether agricultural performance corresponds to changes in measures of welfare in Africa, this section

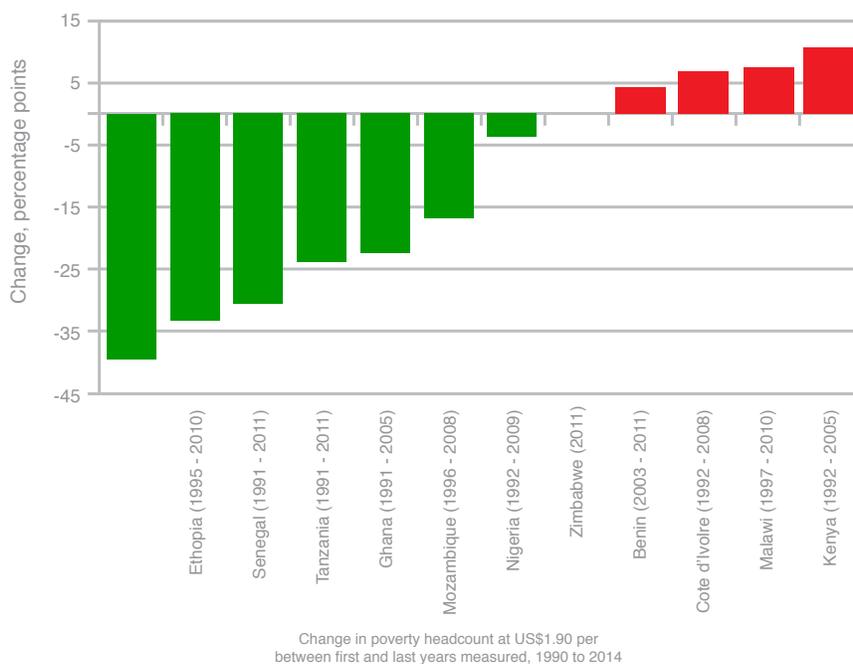
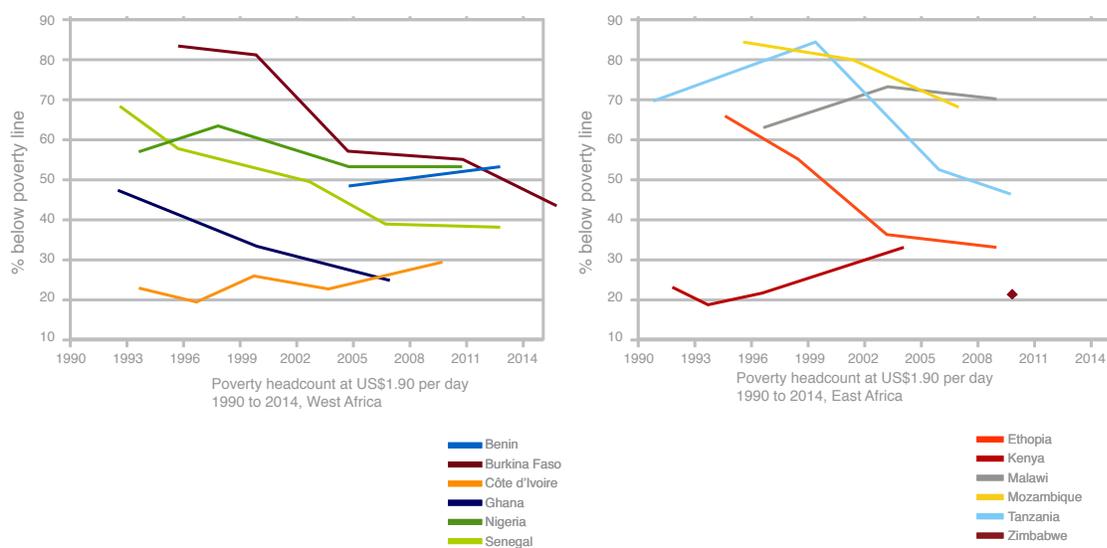
first sets out some summary statistics on poverty and nutrition at country level; before examining associations.

3.5.1 POVERTY TRENDS

The incidence of poverty has been falling across most of the selected countries between 1990 and the early 2010s, although to varying degrees. Exceptions include Benin, Côte d'Ivoire, Malawi and Kenya where poverty has risen (Figure 14).

Some remarkable reductions have been seen, largely since the mid-1990s, for Burkina Faso, Ethiopia and Tanzania. On the most recent surveys, Ghana records the lowest rate of deep, US\$1.90-a-day poverty at 25 percent, while Malawi has the highest, at 71 percent.

Figure 14 Poverty since 1990, 12 countries of Sub-Saharan Africa



Source: Author's own, based on World Development Indicators.

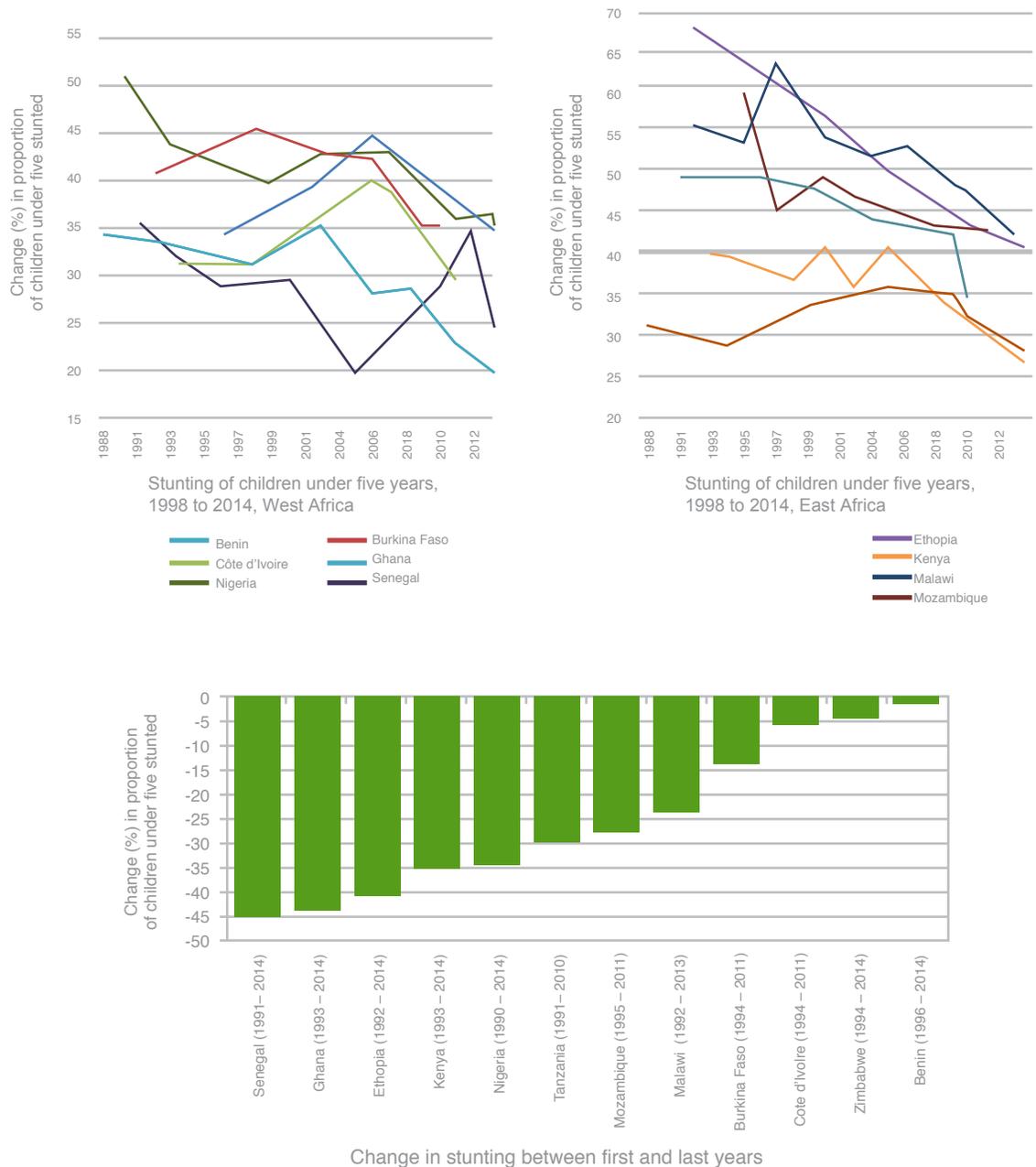
3.5.2 NUTRITION TRENDS

Moderate stunting of children under five years has been falling in all of the 12 countries since 1988 (Figure 15). In some cases, the reductions since the late 1980s are remarkable: more than 30 percentage points in Senegal, Ghana, Ethiopia, Kenya and Nigeria. In a generation, stunting has gone from being the norm for most children, to a condition applying to a minority. Western Africa generally has lower rates of stunting than Eastern Africa.

In some of the countries, reductions in stunting stand in stark contrast to rising poverty, with Kenya – 35 percentage points less stunting – and Malawi – 25 percentage points less stunting, as prominent examples. Since the measurement of nutrition is more accurate than that of poverty, one might conclude that stunting may be a truer representation of changes in rural welfare.

These encouraging improvements in child nutrition cannot necessarily be attributed to increased food

Figure 15 Stunting rates of children under five years, 12 countries of sub-Saharan Africa, 1988 to 2014



Source: Author's own, based on Demographic and Health Surveys (as compiled by the World Health Organization, www.who.int/gho/database/en/), from direct measurements of height for children of less than five years of age. Incidence shown is that of moderate stunting, that is more than two standard deviations below the reference.

production or rising incomes: nutrition is the outcome of several factors, in which health is as important as food intake. It is a reasonable surmise¹¹ that a good part of the improvement results from primary health programmes and better water and sanitation. That said, it would probably be difficult to achieve these results if food intake and feeding had actually worsened since the late 1980s.

3.5.3 AGRICULTURAL PERFORMANCE, POVERTY AND NUTRITION

Increases in agricultural production per person and reductions in poverty headcount since the early 1990s do not correspond well (Figure 16a): for the 12 selected countries the correlation coefficient is just -0.11. Nevertheless, some countries seem to show a close correspondence between increases in agricultural output per person and lower poverty, with Ethiopia a good example. Inspection of the chart suggests that outlying cases reduce the correlation to low levels. Countries with markedly less poverty reduction than might be imagined for their agricultural growth include Benin and Malawi; those with more poverty reduction than might be expected from agricultural performances include Burkina Faso, Senegal and Zimbabwe – the last being a case where agricultural decline is not associated with an increase in poverty.

Greater agricultural production per person is more strongly associated with declines in stunting of children (Figure 16b), for which the correlation coefficient is -0.22. Again, the chart suggests that the low correlation may arise from outliers to the expected relation. Again, Benin and Malawi show less reduction

in stunting than increased agricultural output per person might suggest; while Kenya and Senegal have greater reductions in stunting than their agricultural performance might warrant.

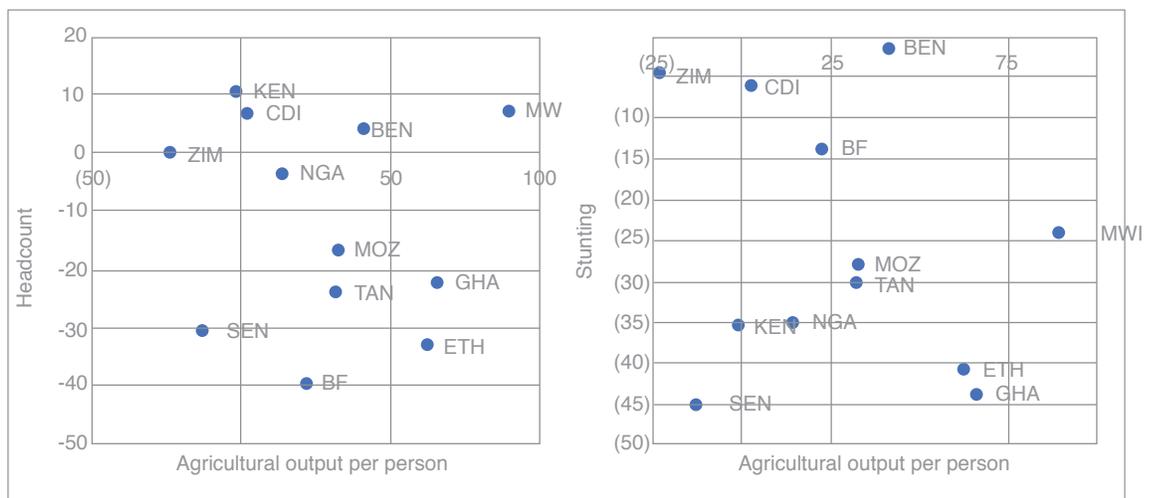
3.6 Summarising changes seen

In the 12 countries, as well as for many of the regions of Africa, economies are growing at least moderately well. Agriculture represents a declining share of the economy, as would be expected and desired for development. Nevertheless, structural transformation is not as developmental as some would like, since manufacturing is, if anything, shrinking as a share of the economy in most countries.

Population growth remains high across much of Africa, so that what would otherwise be quite impressive overall economic growth is much less so per person. Rural populations may be growing more slowly than national, but they are still increasing, and quite rapidly for rural areas. For at least another generation most rural areas will accommodate more people, with denser settlement and consequent pressure to sub-divide smallholdings on the deaths of current heads of households.

Agricultural output has grown quite strongly since 1990, doubling or more in most cases. The increases in output are similar to those seen in Asia over the same period. When, however, population growth is taken into account, then the gains in agricultural output per person are much more modest, although positive for most regions and countries of Africa. African agricultural growth per person lagged well behind that of Asia, where population growth has been much less rapid.

Figure 16 Growth of agricultural output per person, reduction of poverty and stunting, early 1990s to early 2010s



Sources: Author's own, compiled from FAOSTAT data, World Development Indicators and Joint Malnutrition Estimates, 2014, World Health Organization (www.who.int/nutgrowthdb/estimates2013/en/).

Increased farm output in Africa has come primarily from considerable additions of land and labour since 1990. Even so, land productivity has risen in much of Africa by around 50 percent since 1990: an effect that can be seen for the specific case of maize yields. The qualification is that land productivity in the early 2010s in Africa is for most areas still low, well behind that seen in Asia. Yields of many crops are much less than can be achieved by applying better technology.

With less reliable data, the indications from half a dozen African countries are that labour productivity has been rising as well, but modestly so.

The widening gap between the value of agricultural exports and the cost of agricultural imports has been seen as a sign of agricultural failure. The gap certainly exists and is growing. Agricultural exports, however, have increased at a faster rate than growth of output since 1990: an increasing share of agricultural output is being exported across much of Africa.

The trade deficit thus arises from the even faster increase in agricultural imports. Cereals imports to Africa, in particular, have increased almost four-fold since 1990. Some of those imports, however, are less the result of domestic agricultural shortfalls, and more the consequence of urban populations demanding superior staples, such as wheat and rice, in preference to indigenous staples such as cassava, yam, millet and sorghum.

Looking at welfare outcomes of poverty reduction and stunting, for the selected countries reviewed, poverty has generally been falling. Stunting of children, however, has been falling widely and substantially. Agricultural growth per person does not seem to be associated with changes in poverty, but does seem to be correlated with improvements in child nutrition, even if not strongly so.

4. CONCLUSIONS: MESSAGES FOR APRA

In 1990, much of sub-Saharan Africa had experienced almost no economic growth per person since the early 1970s. Agriculture was growing slowly, in many places failing to match population growth. Pessimism about the prospects for agricultural development, and development in general, was deep and pervasive. Indeed, during the 1980s and 1990s aid donors reduced their spending on agricultural development in Africa, since they saw agriculture as a difficult business where projects were too prone to failure.

By 2018, things had changed. Both thinking about agricultural development and the circumstances in which it takes place are very different. In thinking, agricultural development has returned as a strong priority within strategies and plans for development in many countries of Africa. Even those who stress the importance of transforming the economies of Africa away from agriculture and primary production, towards urban-based industry and services, recognise that this will be much facilitated if agriculture can become more productive. Moreover, those favouring industrialisation see developing industries in the agricultural supply chains that process farm output as a prime means to develop industrial competences.

A broad consensus on agricultural development in the 2010s can be seen. A central focus is the need to raise productivity in agriculture through the application of proven technology. To realise this, government has to provide the conditions to enable this – a supportive investment climate and rural public goods; but beyond these, private initiative is paramount. Farmer investment and innovation is to be very largely facilitated by private firms supplying inputs, advice, finance and buying and processing output. This raises questions about how to overcome the shortcomings of rural markets that so far have left most smallholders without access to quality inputs, services and finance at reasonable cost. Across Africa, a plethora of initiatives by governments and their development partners, NGOs, farmer groups and private firms can be seen that try to remedy those failings.

Strategy papers from Africa-wide centres in the 2010s concur that agricultural development needs to focus first and foremost on smallholders, with their

development seen as both feasible and desirable. This emphasis is not shared by all governments, where some voices argue that modernisation of agriculture must necessarily mean (at least some) farming at medium and large scales. Nor does it always reflect changes on the ground. The international land deals sparked by the spikes in world prices in 2008 may for the most part not have come to fruition; but the acquisition of land by domestic investors based in urban areas to create medium-scale farms seems to have taken place on a considerable scale in several countries.

On the one hand, the new medium-scale farms may provide a proving ground for measures to assist agricultural development: the more diverse the farm structure, the more models of input supply, finance and marketing that can be tested. Useful partnerships may even be forged between smaller- and larger-scale farmers. On the other hand, the dangers of rentier interests are clear: that the medium-scale farms will seek to monopolise land, access to public services, and markets, marginalising smallholders in the process.

A further challenge lies with the environment, in some areas increasingly under pressure from rural population growth, as well as from climate change that is already altering the weather. The need to adopt more sustainable practices that are also adapted to changing climate, preferably also mitigating emissions of greenhouse gases, is almost universally recognised. It is, however, not clear that policies and investments are being redirected sufficiently to address these challenges.

Policies for agriculture have changed considerably from those seen in the 1970s and 1980s, when heavy implicit taxation of farmers often stymied agricultural development. Yet recent policies are far from perfect. Farmers' returns are diminished by high costs in supply chains. Public support to agriculture tends to take the form of input subsidies, rather than investments in roads and research that can have greater impact on productivity and hence higher pay-offs over the medium-to-long run.

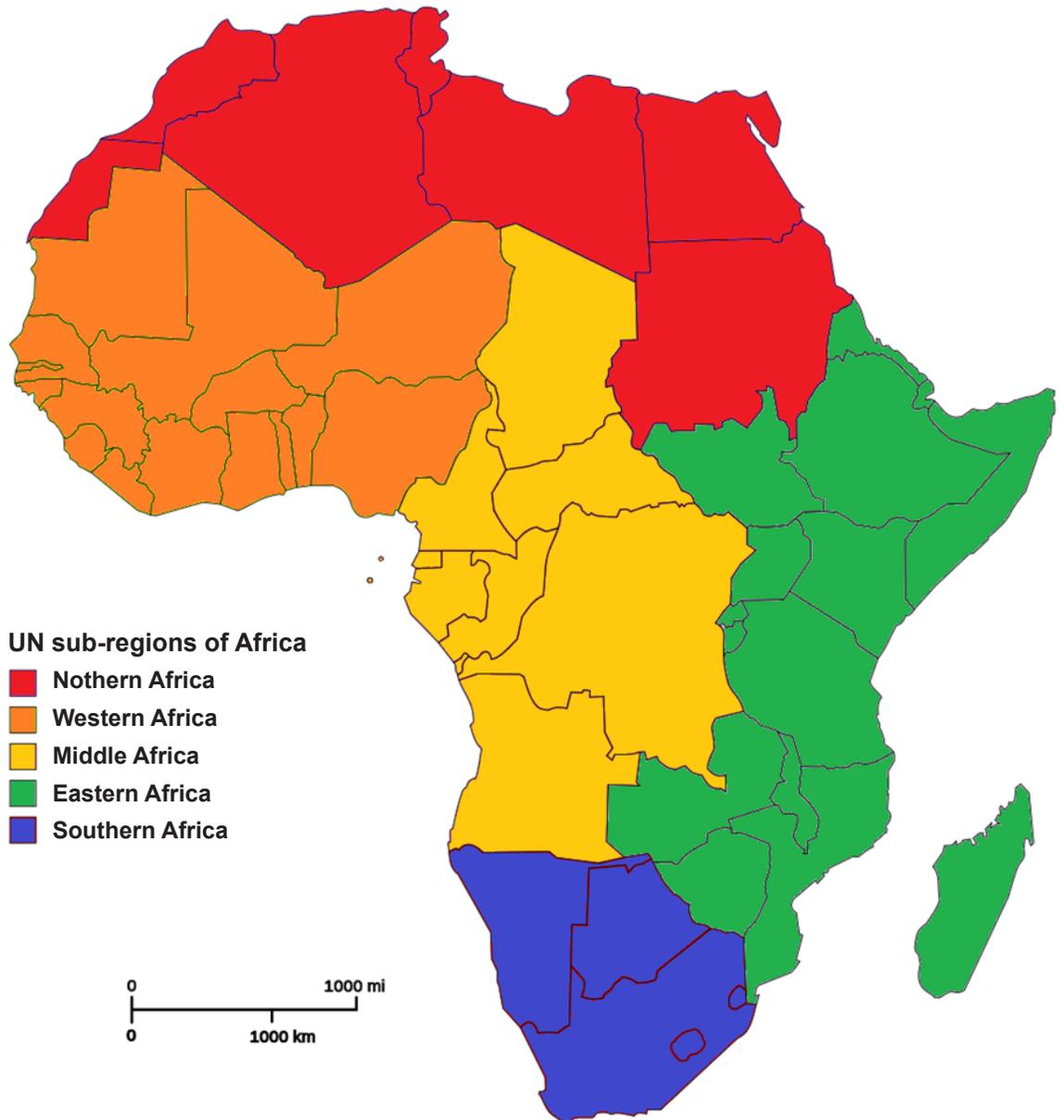
It is not hard to see why policies are less than optimal: transfers and subsidies are vote winners in ways that agricultural research rarely, if ever, is.

As ideas have changed, so too have the circumstances in which agriculture develops. In many respects, the context for development has changed for the better since 1990. Across much of sub-Saharan Africa, economic growth has resumed, with quite rapid growth in some countries. Urbanisation, with an associated middle class, is creating markets for farmers, especially for higher-value produce. The deficit on agricultural trade provides scope for substituting domestic for imported production.

This, then, is the context for the commercialisation of agriculture in sub-Saharan Africa. The opportunities for increased commercialisation are clear, in domestic and international markets. The means to produce and market more are greater than in the past. The political priority to agricultural development is promising. Substantial challenges arise, however, in overcoming the disadvantages that smallholders face in rural markets, the need to generate decent jobs for the large youth cohorts stepping into the job market, and making agriculture environmentally sustainable and climate smart.

ANNEXE A

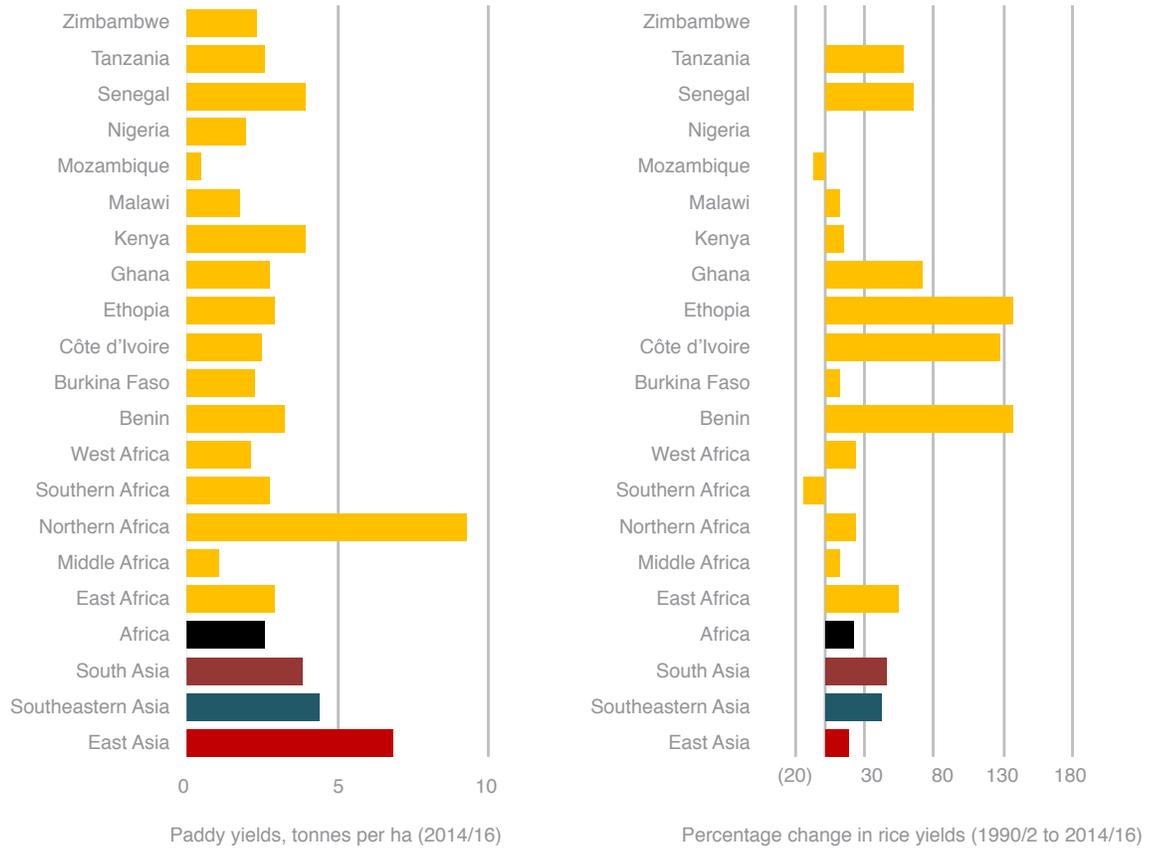
Figure A1 UN regions of Africa mapped



Source: Wikimedia Commons (https://en.wikipedia.org/wiki/File:Africa_map_regions_2.png).

ANNEXE B

Figure A2 Rice yields



Source: FAOSTAT.

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1. <https://goo.gl/vpW5Zp>
2. Movement of labour out of farming was greater in countries that had large shares of the workforce in farming, and those that had achieved at least one target set by the Comprehensive Africa Agriculture Development Programme (CAADP).
3. A pattern long observed in the mining economies of Southern Africa (Low 1986) where both public policy makers and mine owners had no intention of allowing migrant miners to remain once they retired, and discouraged migrants from travelling with dependants.
4. Two arguments are offered against the prospects for manufacturing in the short term. One is that most African countries lack the infrastructure, labour skills and stability that would make them attractive for investment in modern manufacturing plants. The other is that given the very small size of manufacturing sectors in most countries of sub-Saharan Africa, even rapid growth would not create jobs on the necessary scale to accommodate the large numbers of young people entering the labour market.
5. They note that use of randomised control trials can only be used to answer micro questions of development, most famously, 'are treated bednets effective against malaria?' that leaves most of the larger questions about processes of development unanswered. Moreover, the results of such investigations often lack contextualisation so that their external validity is in doubt. They conclude: 'We must nevertheless recognise that such approaches [to answering the wider questions of development] will be as much art as science. The evidence base and theory will not be sufficient to provide clear and detailed predictions on the effects (and particularly the general equilibrium effects) of lifting particular constraints. As with all policy advice, researchers need to be transparent as to the limitations of their analysis and clear about the borders between evidence and assumptions' (Dercon and Gollin 2014).
6. To some extent this arises from the problem of using the nation as a unit: settlement density and the intensity of land use can vary greatly within national boundaries. Only a few countries in Africa do not contain a very wide variety of agro-ecological zones.
7. Although transport costs have not necessarily fallen as much as roads have improved: road quality is just one dimension of transport costs.
8. For the most part the UN classification of countries (see Annexe A for a map) corresponds to previous regional groupings, but there are some surprises. The main one is that Southern Africa is restricted to the five countries that make up the Southern African Customs Union (SACU). Countries often considered part of Southern Africa, such as Mozambique and Zimbabwe, belong to the (large) Eastern Africa region. Northern Africa includes Sudan.
9. This over-estimates land productivity since it includes the value of livestock production, some of which will come from grazing land. Given that the productivity of livestock per unit tends to be higher for animals kept in stalls and backyards than those kept on grazing land, the over-estimate should be quite small.
10. Even then, formal statistics miss out on informal, cross-border trade.
11. It is a development oddity that some of these considerable successes have been neither as celebrated as they deserve to be, nor properly explained. Ghana is a case in point. Recent correspondence with an internationally-renowned nutrition specialist confirms that no-one quite knows just how Ghana has achieved these reductions in nutrition. Yes, there have been improvements in many of the intermediate factors that determine child nutrition – incomes, primary health care, water and sanitation, etc.; but the weight of the different contributions is not known.

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