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Structural Change and Africa's Poverty Puzzle

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Sub-Saharan Africa has enjoyed nearly twenty years of sustained economic growth. The region grew at around 4.6 percent a year during the last decade, exceeding the average for the rest of the developing world (excluding China) by about 1 percentage point.[1] Per capita income has been rising steadily, and with six of the world's ten fastest-growing countries, cheerleaders as diverse as *The Economist* and the World Bank have branded Africa the developing world's next "frontier market." At the same time, however, there are growing concerns that rapid economic growth has not produced equally rapid poverty reduction. Poverty has declined, to be sure. An estimated 58 percent of people in sub-Saharan Africa were living on less than $1.25 a day in 2000; by 2010 the poverty rate had fallen to 48.5 percent (World Bank 2013). But while East and South Asia managed to reduce extreme poverty dramatically over the last two decades, sub-Saharan Africa failed to keep pace.

Poverty in Africa presents something of a puzzle. The region has both the lowest responsiveness of poverty to per capita income growth and the lowest responsiveness of poverty to changes in income distribution of any of the world's developing regions. Africa's structural pattern of growth during the last two decades is at least partly responsible. In Asia economies that succeeded

1. If South Africa is excluded, the regional average is an even more impressive 5.2 percent (World Bank 2013).

in rapidly reducing poverty experienced significant changes in their economic structure, as workers moved from low-productivity sectors such as agriculture into higher-productivity manufacturing. In Africa structural change has contributed very little to growth and poverty reduction.

Until the turn of the twenty-first century an increasing share of African workers found themselves in low-productivity, low-wage jobs. Since about 2000 there is some evidence that structural change in Africa has been growth enhancing, but even here the news is not entirely good. In contrast with Asia, where a manufacturing revolution drove structural change, recent structural change in Africa has consisted largely of the movement of labor from agriculture to services such as trade and distribution. Manufacturing in Africa has failed to take off. Both cross-country evidence and country-level simulations suggest that Africa's performance in reducing poverty would have been better had the region started its structural transformation earlier and had it experienced more robust growth of manufacturing and other sectors with high value added per worker.

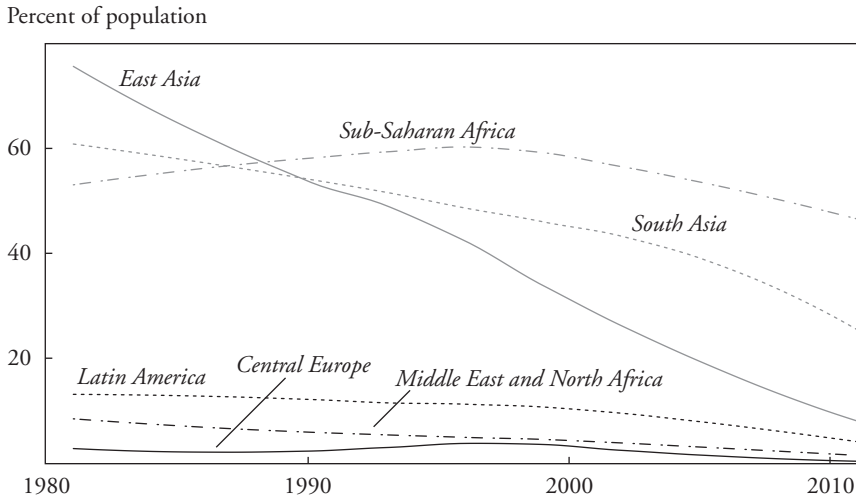
Solving Africa's poverty puzzle will require African governments—and their development partners—to move in new policy directions. First, new initiatives to increase productivity in agriculture are needed. Because Africa is starting from such a low base with respect to high-productivity employment, rapid early progress on poverty requires raising incomes where the poor are already employed. Second, Africa needs an industrialization strategy. Creating dynamism in manufacturing through public actions that emphasize exports and industrial clusters is essential. Africa can also build on its comparative advantage in agroindustry and tradable services. Because these industries without smokestacks share many firm characteristics with manufacturing—including the capacity to create large numbers of good jobs—the types of public action needed to boost manufacturing can be effective here as well.

This chapter unfolds in five sections: the first describes Africa's poverty puzzle; the next presents evidence on the role of structural change in growth in Africa and contrasts it with patterns of structural change in comparator economies when they were at similar levels of development. The following section uses both cross-country evidence and simulations for a number of African economies to show how lack of structural change has impeded poverty reduction in Africa. The next section argues that to eradicate absolute poverty, African governments and their development partners will need to develop a new approach to poverty reduction. A concluding section sums up the chapter.

Africa's Poverty Puzzle

As the global community turns to the ambitious goal of eradicating absolute poverty by 2030, most of the heavy lifting needed will have to come from

Figure 7-1. *Extreme Poverty in the Developing World, by Region, 1980–2010*



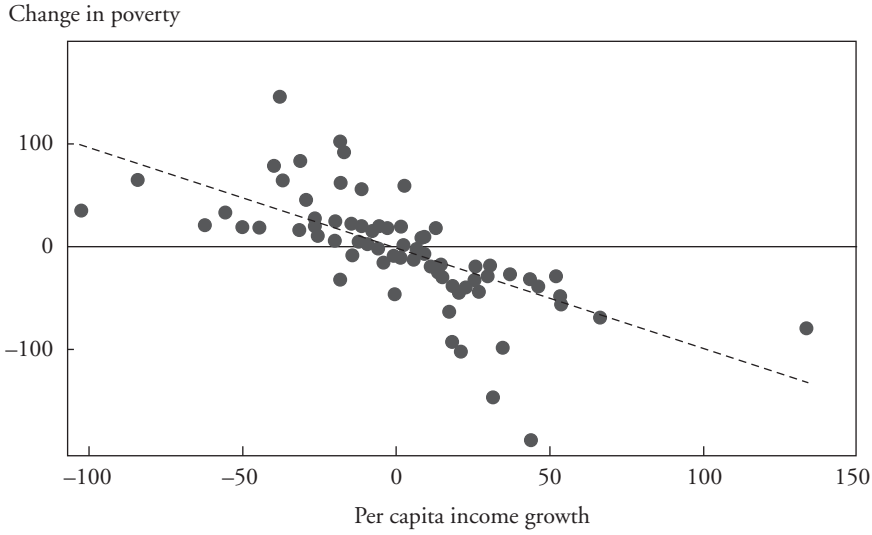
Source: World Bank PovcalNet database.

Africa. China, India, and sub-Saharan Africa account for three-quarters of the world's people living on less than $1.25 a day. For this reason poverty reduction since 1990 has resembled a "relay race in which responsibility for leading the charge on global poverty reduction passes from China to India to sub-Saharan Africa" (Chandy, Ledlie, and Penciakova 2013). This may pose a problem for the last mile.

East and South Asia—regions with the highest poverty rates in the 1980s—managed to reduce extreme poverty dramatically over the last two decades, but sub-Saharan Africa failed to keep pace (figure 7-1). Today more people are estimated to be living on less than $1.25 a day in sub-Saharan Africa—413 million in 2010—than in 1999 (World Bank 2013). In the World Bank's words, "Despite the continent's growth turnaround and progress in the fight against poverty during the last decade, poverty in Africa remains unacceptably high, and the pace of reduction unacceptably slow" (World Bank 2013).

There is a large literature on the relationship between economic growth and poverty reduction (Datt and Ravallion 1991; Chen and Ravallion 2010; Dollar and Kraay 2002). It shows that, across countries and over time, the poverty rate—the proportion of the population falling below a specified poverty threshold—declines as per capita income rises. But differences among countries (and regions) with respect to the rate at which poverty falls with income growth are substantial (Fosu 2011).

Figure 7-2. *Poverty Reduction and Growth in African Countries, 1995–2005*



Source: Author's estimates using World Bank PovcalNet database.

The usual suspect to account for such differences is income inequality. Cross-country evidence indicates that the growth elasticity of poverty is larger for economies with less initial income inequality (Ravallion 2001; Adams 2004; Fosu 2011). Changes in inequality during growth can also influence the rate of poverty reduction. A number of country studies decompose the contributions of inequality and income growth to poverty reduction. They find that distributional changes during the course of growth have substantial impacts—both positive and negative—on changes in poverty (Datt and Ravallion 1992; Kakwani 1993).

Thus to understand why, despite rapid growth, progress against poverty in Africa has been disappointing it is important to understand how Africa compares to other regions with respect to income growth and inequality.[2] Using comparable household surveys, Page and Shemeles (2014) test the relationship between per capita income growth and poverty reduction for eighteen African countries. The results appear in figure 7-2. While the authors find the expected negative correlation between income growth and poverty

2. One part of Africa's slower pace of poverty reduction is easy to understand: Africa has much higher rates of population growth than Asia; therefore, while GDP growth has been similar between the two regions over the past fifteen years, per capita income growth was much higher in Asia.

incidence—a 1-percent increase in growth results on average in a decline in poverty of about 0.95 percent—the estimated relationship is imprecise and relatively weak, indicating that individual country experiences across Africa vary substantially. The results also confirm an important finding of other cross-country estimates of the relationship between growth and poverty. Africa has the lowest elasticity of poverty with respect to per capita income growth of any of the world's developing regions (Fosu 2011; Christiaensen, Chuhan-Pole, and Sanoh 2013).

The usual suspect matters: Africa has the world's highest level of income inequality (World Bank 2013). This diminishes the impact of growth on the poor, but it is not the full answer. Poverty in Africa also appears to be less responsive to changes in income distribution, controlling for the rate of growth of income, than it is in other parts of the world. Cross-country estimates of the partial elasticity of poverty reduction with respect to income distribution find that they are lowest in Africa, often by wide margins (Fosu 2011). Moreover, there appears to be no systemic relationship between growth and income inequality: countries in Africa that are growing experience increases and decreases in inequality in roughly equal numbers (World Bank 2013).

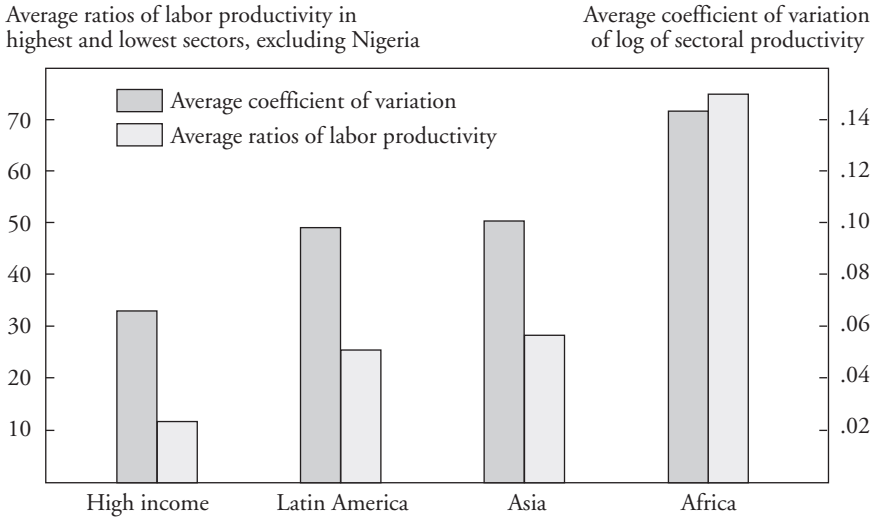
Thus we are left with a puzzle. Since 1995, growth in per capita income has reduced poverty in Africa but at a slower rate than in other parts of the world. Income inequality has played a role. Africa is the world's most unequal region, but poverty in Africa is less responsive to changes in inequality as well. Neither high inequality nor changes in inequality fully account for the differences between Africa and elsewhere. Why is poverty in Africa less responsive to growth? The answer may lie in the structure of Africa's recent growth.

Structural Change and Growth

Developing economies are characterized by large differences in output per worker across sectors, and those economies that successfully make the transition from low-income status to high-income status typically experience significant changes in their economic structure (Kuznets 1955; Chenery 1986). As factors of production move from lower productivity uses to higher productivity uses, there is a substantial growth payoff (Duarte and Restuccia 2010; McMillan and Rodrik 2011).

There is little evidence, however, that significant structural changes have underpinned Africa's more rapid growth (Arbache and Page 2008). Since 1995, its growth has been driven primarily by strong commodity prices, new natural resource discoveries, and better economic management (Arbache and Page 2009). Africa has the greatest differences across sectors in output per worker (figure 7-3). Research, however, finds that this potential has not been fully

Figure 7-3. *Labor Productivity among Sectors, by Country Group, 2005*



Source: McMillan and Rodrik (2011); author's calculations.

realized (McMillan, Rodrik, and Verduzco-Gallo 2013; de Vries, Timmer, and de Vries 2013).

Changes in output per worker have two components. One is the weighted sum of labor productivity growth within individual sectors, where the weights are the employment shares of each sector in the beginning period. This is defined as the within-sector component of productivity growth. The second component captures the productivity effect of labor reallocations across different sectors. It is the product of productivity levels in the end period with the change in employment shares across sectors. This is defined as the structural change component.

The decomposition is presented for 1990–2005 and for two subperiods, 1990–99 and 2000–05, in table 7-1. Among developing countries, the regional patterns of productivity change are strikingly different, and they change over time. In Asia the movement of workers from lower to higher productivity sectors increased the overall rate of productivity growth in both periods. This was growth-enhancing structural change. In Latin America and Africa over the entire fifteen-year period structural change worked to offset productivity improvements within sectors, reducing overall growth.

Africa's pattern of structural change shifted between the two subperiods. From 1990 through 1999 structural change in Africa looked more like Latin America's than Asia's. While output per worker increased within sectors, the

Table 7-1. *Decomposition of Productivity Growth, Four Country Groups, Various Years*

Percent per year

	Labor productivity growth	*Due to within-sector productivity growth*	*Due to structural change*
		1990–2005	
Asia	3.87	3.31	0.57
High income	1.46	1.54	–0.09
LAC	1.35	2.24	–0.88
Africa	0.86	2.13	–1.27
		1990–99	
Asia	3.85	3.25	0.60
High income	1.56	1.54	0.02
LAC	1.75	1.77	–0.02
Africa	–0.20	0.20	–0.40
		2000–05	
Asia	3.87	3.40	0.47
High income	1.21	1.41	–0.20
LAC	1.02	1.90	–0.88
Africa	2.15	1.20	0.95

Source: McMillan and Rodrik (2011); McMillan (2013).

share of workers employed in high-productivity sectors declined. Structural change offset rising within-sector labor productivity and was growth reducing. Structural shifts in employment more than fully offset the positive contribution of within-sector productivity growth to overall productivity growth.

After 2000 labor began to shift from lower productivity to higher productivity employment. This is good news, but it comes with two cautionary warnings. The first is that within-sector productivity growth, despite a significant improvement over 1990–99, remained substantially lower than in Asia and Latin America, with the result that the region's total labor productivity growth rate was about half of Asia's. The second warning lies in the nature of the structural change that was taking place. Historically, industry—and especially manufacturing—has led structural change. It is a high-value-added sector into which labor can flow. Given the very large difference in output per worker between agriculture and industry and its potential to absorb labor, industrialization presents a significant opportunity for growth-enhancing structural change.

Globally, growth in income at early stages of development is associated with very rapid increases of the share of manufacturing in total output (Dinh and others 2013). This pattern of structural change provides a powerful engine of productivity growth. Duarte and Restuccia (2010) find that rising productivity in industry, combined with structural change out of agriculture and into industry, explains 50 percent of the catch-up in aggregate productivity by developing countries between 1950 and 2006. Using a large panel of countries, Rodrik (2013) finds that since 1960 manufacturing industries have exhibited unconditional convergence in labor productivity to advanced economy levels, regardless of country or regional factors.

Africa's pattern of structural change since 2000 is significantly different. The share of manufacturing in GDP has remained the same for more than forty years. In 2010 it was 10 percent, slightly lower than in the 1970s (de Vries, Timmer, and de Vries, 2013). The region's share of manufacturing in GDP is less than half the average for all developing countries, and in contrast with developing countries as a whole, it is declining. Manufacturing output per capita is about one-third of the global developing country average (Page 2012b). Only four African countries—Madagascar, Mozambique, Lesotho, and Côte d'Ivoire—have a share of manufacturing in total output that exceeds the predicted value for their level of income. Many of the region's recent growth success stories—Ethiopia, Ghana, Kenya, Tanzania, and Uganda—have manufacturing value added shares that are well below the predicted values (Dinh and others 2013).

A "Premature" Shift to Services

The structural change that has taken place in Africa since 2000 has been a shift of labor out of agriculture and manufacturing into services. Table 7-2 presents recent estimates of the sectoral distribution of output and employment for eleven African countries over the period 1990–2010. A number of stylized facts emerge from the data. Agriculture's share of the economy has declined in terms of output and employment. Industry—and especially manufacturing—has declined as a share of total output and as a share of total employment. Services have taken up the slack. Between 1990 and 2010 the share of the African workforce employed in market services nearly doubled, from 12.9 percent to 23.5 percent. In 2010 on average 20 percent of the African workforce was employed in distribution services, up from 11 percent in 1990.

This pattern of structural change represents a movement from very low-productivity employment to slightly higher productivity jobs. For the nine African countries in the original McMillan and Rodrik (2011) database, agriculture—at 36 percent of average productivity—is by far the sector with the lowest productivity; manufacturing productivity is six times higher, and that in mining is nearly sixty times higher. These productivity gaps across sectors are enormous.

Table 7-2. *Structure of African Economies, by Sector, 1990 and 2010*[a]

Percent

	Value added share		*Labor share*		*Relative productivity*	
Sector	*1990*	*2010*	*1990*	*2010*	*1990*	*2010*
Agriculture	24.9	22.4	61.6	49.4	0.4	0.4
Industry	32.6	27.8	14.3	13.4	3.5	2.6
Mining	11.2	8.9	1.5	0.9	23.9	19.5
Manufacturing	14.0	10.1	8.9	8.3	2.4	1.6
Other	7.3	8.8	3.9	4.2	5.3	2.9
Services	42.6	49.8	24.1	36.8	2.4	1.6
Distribution	28.1	34.0	12.9	23.5	3.0	1.8
Finance and business	5.4	8.6	1.5	3.4	10.4	8.1
Government	11.5	12.2	6.4	8.7	2.5	1.7
Other	2.9	3.5	5.3	5.4	1.0	1.0

Source: Gronnengen Africa sector database, as reported in deVries, Timmer, and deVries (2013).

a. Figures are unweighted averages across eleven African countries. Employment and output data include both formal and informal activity. Other industry includes construction and public utilities. Distribution includes transport services and distributive trade as well as hotels and restaurants. Finance and business services exclude real estate activities. Other services include other community, personal, and household services. Numbers may not sum due to rounding.

The majority of employment in the African sample is in the least productive sectors. Roughly three-quarters of the labor force is in agriculture and wholesale and retail trade.

Africa's shift into services is premature because it has occurred at a much lower level of per capita income than in other countries. In early stages of development, rapidly growing developing countries have typically reallocated most labor into manufacturing. The share of activity in manufacturing follows an inverted U shape: increasing during early stages of development and then decreasing as higher incomes drive demand for services and labor costs make manufacturing more difficult (Chenery 1986; Duarte and Restuccia, 2010; Herrendorf, Rogerson, and Valentinyi 2013).

In Africa workers have been moving into services such as retail trade and distribution (de Vries, Timmer, and de Vries 2013). Today, the share of Africans employed in the distribution sector is about the same level as in the OECD (Jorgenson and Timmer 2011). Moreover, services have been absorbing workers faster than the sector has been increasing output. The relative productivity level of market services fell from 3.0 times the total economy average in 1990 to 1.8 in 2010, suggesting that the marginal productivity of new services workers is low and possibly negative (de Vries, Timmer, and de Vries 2013).

Table 7-3. *Structure of Africa's Economies: Share of Labor Force in Four Sectors*[a]
Percent

	Share of labor force			
Country/benchmark	*Agriculture*	*Manufacturing*	*Other industry*	*Services*
Least developed country benchmark (US$600–700)	70.0	9.0	3.0	18.0
Ethiopia 2005	83.2	4.1	1.5	11.2
Malawi 2004	77.6	2.9	3.1	16.4
Low-income benchmark (US$900–1,100)	60.9	11.5	2.9	24.7
Mali 2005	66.0	3.1	2.9	28.0
Rwanda 2010	79.0	1.9	2.1	17.0
Tanzania 2005	76.7	2.1	2.7	18.5
Uganda 2005	72.0	3.0	2.0	23.0
Zambia 2005	72.9	3.1	3.4	20.6
Transitioning and lower middle-income benchmark (US$1,200–500)	57.9	13.7	3.0	25.4
Ghana 2005	48.1	11.0	4.1	36.8
Kenya 2010	48.3	12.8	3.6	35.3
Nigeria 2010	59.6	3.9	2.0	34.5
Senegal 2005	52.8	9.0	4.0	34.2
Upper middle-income benchmark (US$10,000)	14.0	25.0	4.0	57.0
Botswana 2005	39.2	5.9	8.4	46.5
Mauritius 2010	7.2	19.1	11.2	62.6
South Africa 2010	15.0	13.2	10.0	61.8

a. Structural characteristics are from the most recent year of available household survey data. The benchmarks used are as follows: least developed, BGD 1994, CAM 1996, CHN 1987, IND 1989, IDN 1982, VNM 1992; low income, BGD 2003, CAM 2002, CHN 1992, IND 1994, IDN 1986, THL 1980, VNM 1996; transitioning, CAM 2005, CHN 1995, IND 2000, IDN 1992, PHL 1982, THL 1985, VNM 2001; middle income, CHL 2003, KOR 1993, MYS 2004.

Benchmarking Africa's Economic Structure

Table 7-3 compares the employment structure of a sample of fourteen African countries with the distribution of employment of four "benchmark" economies, made up of non-African economies—mainly in Asia—that have had sustained success in both growth and poverty reduction. The benchmark countries are Bangladesh, Cambodia, Chile, China, India, Indonesia, Korea, Malaysia,

Philippines, Thailand, and Vietnam. The benchmarks show the structural characteristics of these economies at the time that they were at the same level of per capita income (in international PPP US$) as the contemporary African economies in the sample. The labor share values for the benchmarks in the table are the simple averages of the labor shares of the relevant benchmark countries at the time their per capita incomes (in PPP US$) were equal to the African countries in each subsample. (Some basic descriptive statistics on these countries are presented in appendix table 7A-1.)

The African countries in table 7-3 are broken into four groups: least developed (Ethiopia and Malawi); low income (Mali, Rwanda, Tanzania, Uganda, and Zambia); transitioning (Ghana, Kenya, Nigeria, and Senegal); and middle income (Botswana, Mauritius, and South Africa). Comparisons of the individual country employment structures with the benchmarks confirm the narrative above.

Both Ethiopia and Malawi have larger shares of their labor force in agriculture than the benchmark economy. Both have significantly smaller shares of the labor force engaged in manufacturing. And both have smaller employment shares in services than the benchmark. This suggests that these economies are at very early stages of structural transformation, even in comparison with the benchmark economies at the same stage of development.

The low-income economies are in many ways similar to the least developed countries. With the exception of Mali, a substantially larger share of their labor force is employed in agriculture than the benchmark. The share of the labor force engaged in manufacturing is only about a quarter of the benchmark level, while the services share is somewhat lower. Taken together with the least developed country pattern, these data suggest that, below levels of GNI per capita of about US$1,000 (PPP), most African countries have experienced a delayed structural transformation. Too many workers remain in agriculture and too few have moved to industry relative to other developing countries when they were at similar levels of development.

The transitioning economies display an employment structure that reflects the dominant role of services in structural change in Africa. With the exception of Nigeria, the share of employment in agriculture is below the benchmark value. All of the transitioning economies, with the exception of Kenya, have employment shares in manufacturing that are below the benchmark, some—like Nigeria and Senegal—by wide margins. In contrast, the labor share in services for all countries exceeds that of the benchmark by about 10 percentage points.

The middle-income countries display great diversity. Botswana still has a large share of its labor force engaged in agriculture at very low relative levels of productivity. Mauritius and South Africa have more than 60 percent of their labor force engaged in services. Only Mauritius has a labor share in manufacturing that approximates the benchmark economy.

Structural Change and Poverty Reduction

The very different patterns of structural change and poverty reduction in Asia and Africa suggest that the structural sources of growth may partly determine growth and poverty outcomes. In Asia rising output per worker has been due to two strong, complementary components: within-sector productivity is rising, making it possible for firms to offer increases in wages in line with rising output per worker, and at the same time workers are moving from lower-productivity to higher-productivity employment. The result has been very rapid reductions in poverty. Structural change has played a much smaller role in Africa's growth story, and Africa's progress against poverty has been much less successful.

From 1990 to 1999 structural change in Africa was growth reducing: an increasing share of African workers was forced to find employment in sectors that offered low wages or self-employment incomes. After 2000 structural change in Africa became growth enhancing, but in contrast with Asia, the shift of employment toward higher-productivity sectors was not toward manufacturing. It was toward services, and in particular into retail trade and distribution, which offered only modestly higher output per worker than agriculture.

Moreover, as employment shifted into services between 2000 and 2010 there is evidence that both the average and the marginal product of labor in the sector declined. Unlike manufacturing, which offers the potential for very large increases in employment without sharp declines in marginal productivity—particularly in the early stages of development—Africa's recent services-based pattern of structural change does not appear to offer similar potential for rapid growth of real wages and incomes. Put somewhat differently, Africa's pattern of structural change post-2000 can be interpreted as a symptom of poverty rather than as a source of poverty reduction. Workers in agriculture moved to slightly better urban jobs in the services sector but remained trapped in low-productivity, low-wage employment.

Cross-Country Evidence

Consistent data on productivity growth, structural change, and poverty are sparse, but they permit some simple statistical estimates of the relationship between structural change and poverty reduction. McMillan and Rodrik (2011) present data on employment, output, and productivity for twenty-nine developing countries. Six developing economies—one in Asia, two in Central America, and three in Africa—were added to this sample by drawing on compatible national and international data sources. Poverty data ($1.25 a day) were taken from the World Bank PovcalNet database. Because not all countries in the sample are in the PovcalNet database, thirty-three countries form the final data set on structural change and poverty. (These are listed in appendix table 7A-2.)

Tables 7-4 and 7-5 present the results of some exploratory regressions. In addition to the direct regression on the two variables of interest, two additional

Table 7-4. *Rate of Change of Poverty and Productivity Growth, 1990–2005*[a]

	(1)	*(2)*	*(3)*
Constant	0.18	–0.16	–1.48
	(0.11)	(0.09)	(0.68
Productivity growth	–1.13*	–1.16*	–1.16*
	(1.88)	(1.90)	(1.95)
Middle income 1990		1.04	
		(0.44)	
Income relative to U.S. 1990			12.26
			(1.20)
Observations	33	33	33
R^2	0.10	0.11	0.14

t statistics in parentheses; * significant at 10 percent, ** significant at 5 percent, *** significant at 1 percent.

a. Dependent variable is the rate of change of poverty ($1.25 a day). Because poverty at $1.25 vanishes at higher income levels, both the middle-income status of the country in 1990 (as a dummy variable) and income relative to the United States in 1990 were added to test for the stability of the relationship with rising income. Neither variable was significant, and the coefficient estimates of interest were stable.

Table 7-5. *Rate of Change of Poverty and Structural Change, 1990–2005*[a]

	(1)	*(2)*	*(3)*
Constant	–2.70**	–3.13**	–4.20**
	(2.54)	(2.25)	(2.47)
Structural change	–1.72***	–1.75***	–1.71***
	(3.12)	(3.11)	(3.11)
Middle income 1990		1.06	
		(0.49)	
Income relative to U.S. 1990			10.63
			(1.13)
Observations	33	33	33
R^2	0.24	0.24	0.27

t statistics are in parentheses; * significant at 10 percent, ** significant at 5 percent, *** significant at 1 percent.

a. Dependent variable is the rate of change of poverty ($1.25 a day).

specifications are used to provide a simple first test of the robustness of the direct relationship. The results show a strong, statistically significant association between the rate of change in poverty and the structural change component of productivity growth. Higher rates of structural change are associated with more rapid declines in poverty, and the reverse. The relationship between

Table 7-6. *Rate of change of Poverty Productivity Growth and Structural Change, 1990–2005*[a]

	(1)	*(2)*	*(3)*
Constant	–1.69	–1.85	–2.20
	(0.97)	(0.99)	(1.12)
Productivity growth	–0.46	–0.48	–0.48
	(0.74)	(0.90)	(0.95)
Structural change	–1.52**	–1.55**	–1.53**
	(2.45)	(2.47)	(2.46)
Middle income 1990		1.03	
		(0.49)	
Income relative to U.S. 1990			10.44
			(1.13)
Observations	33	33	33
R^2	0.25	0.25	0.27

t statistics are in parentheses; * significant at 10 percent, ** significant at 5 percent, *** significant at 1 percent.

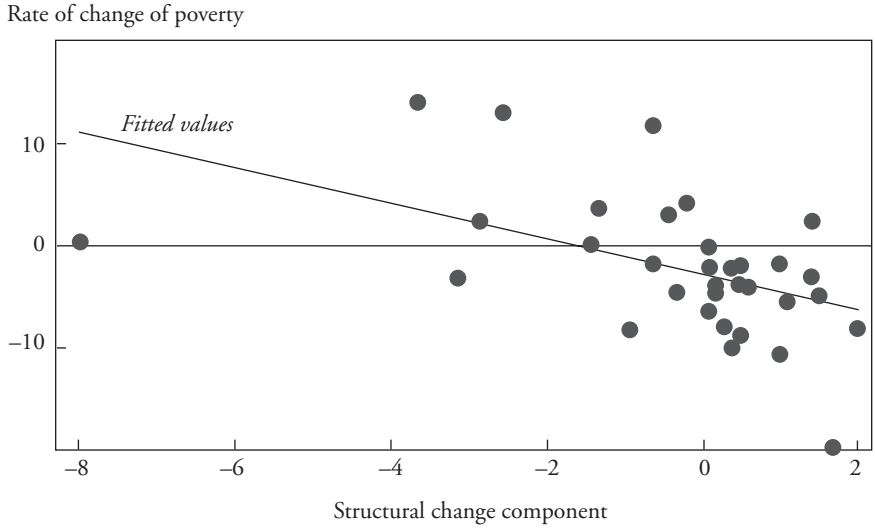
a. Dependent variable is rate of change of poverty ($1.25 per day).

overall productivity growth and poverty reduction is less clear-cut. The explanatory power of the direct regression is lower and the estimated coefficient, while of the predicted sign, is statistically significant only at the .10 level.

Table 7-6 presents the multiple regression of the rate of change of poverty on the rate of change of output per worker and the structural change component of productivity growth. The results confirm the patterns observed in the direct regressions. The fit of the model to the data is better than for the productivity-poverty relationship alone and similar to that for the relationship between structural change and poverty. The productivity-poverty relationship is of the predicted sign but insignificant. The structural change-poverty relationship is similar in magnitude to that of the direct regression and is significant at the 0.05 level. Neither of the controls for convergence to middle-income status is significant. Figure 7-4 presents the partial scatter plot of the rate of change of poverty and the structural change variable, conditional on change in output per worker.

Although the data are limited and the econometrics subject to the usual uncertainties, they nevertheless suggest a strong conjecture. One of the reasons why Africa's growth since 1990 has produced rates of poverty reduction that many regard as disappointing is that the structural sources of growth have in fact worked against more rapid poverty reduction. Although output per worker was rising within sectors, employment in high productivity sectors was not growing fast enough to absorb a rapidly growing workforce. New workers

Figure 7-4. *Partial Scatterplot of Rate of Change of Poverty and Structural Change, 1990–2005, by Change in Output per Worker*



Source: Extended McMillan and Rodrik (2011) database; author's calculations.

were forced into lower productivity, often informal, employment with negative consequences for the overall rate of poverty reduction.

Some Simulations

While the cross-country evidence is indicative of a relationship between structural change and poverty reduction, it is unlikely to convince the skeptics. Another way to assess the extent to which structural change has influenced poverty reduction in Africa is to undertake a set of simulations, using sector-specific poverty data and a counterfactual distribution of employment based on the structural characteristics of the benchmark economies. In effect, this is asking the question, What would the poverty outcome of countries in the Africa sample have been if structural change had been more in line with the observed experience of a benchmark economy at the same level of per capita income?

Sector-specific poverty rates are available from household survey data for twelve of the fourteen countries listed in table 7-3. The poverty data in table 7-7 are reported at the level of three broad sectors—agriculture, industry, and services. Poverty rates are uniformly highest in agriculture. With the exception of Tanzania, they are uniformly lowest in households where the head of household is employed in services. Poverty rates for the industrial sector lie between those

Table 7-7. *Poverty Rates, by Sector of Employment of Head of Household*

Country	*Year*	*Overall*	*Agriculture*	*Industry*	*Services*
Botswana	2005	34.36	43.77	30.41	27.63
Ethiopia	2005	41.56	44.31	34.98	25.16
Ghana	2005	22.60	32.58	11.51	8.22
Malawi	2011	65.60	73.78	50.74	32.05
Mali	2005	47.36	53.46	45.03	33.73
Nigeria	2010	66.80	81.64	55.44	52.80
Rwanda	2010	52.80	58.63	44.83	27.76
Senegal	2005	31.09	56.41	19.24	17.54
South Africa	2006	15.91	17.5	5.83	13.03
Tanzania	2007	62.60	70.63	29.2	37.19
Uganda	2005	36.19	43.94	26.3	14.13
Zambia	2003	64.85	70.1	62.49	47.41

Source: AfDB poverty database; author's calculations.

for agriculture and services. This differs from the patterns observed in Asia, where the poverty incidence in industry is generally below that in services, and the poverty incidence in agriculture is more than double that in the other two sectors (World Bank 2012).

The difference lies in the structure of the industrial and services sectors in Africa itself. Manufacturing and services in most African economies are dominated by informal firms. Although informal manufacturing is a source of employment and income, it is not a powerful engine for poverty reduction (Duflo and Banerjee 2004). In Africa, as in other parts of the developing world, formal firms are highly productive and pay higher wages, especially large formal firms; informal firms are small and much less productive (La Porta and Shleifer 2011a, 2011b; Page and Soderbom 2012). The contrast between formal and informal services is equally stark. Clearly, informal firms have an important role to play in providing a livelihood for poor people in Africa, but they do not offer the types of high-wage jobs that draw workers out of poverty. The inability to distinguish between formal and informal segments of manufacturing and services in terms of both their relative size and poverty incidence thus limits the precision of the simulations.

Table 7-8 reports the results of the simulations. While there is considerable variation in the country-by-country results, the main takeaway is clear. Had Africa's economies gone through patterns of structural change that were more like those of the benchmark economies, poverty reduction would have been greater. The median change in the poverty rate for the twelve countries in the sample is

Table 7-8. *Structural Change and Poverty Simulations, Twelve Countries*

Country and year	*Observed poverty rate*	*Simulated poverty rate*	*Percentage change in poverty*
Ethiopia 2005	41.6	39.7	–4.6
Malawi 2011	65.6	63.5	–3.2
Mali 2005	47.4	47.4	0.0
Rwanda 2005	52.8	48.5	–8.1
Tanzania 2007	62.6	55.2	–11.8
Uganda 2005	36.2	34.0	–6.1
Zambia 2003	64.9	63.4	–2.3
Ghana 2005	22.6	22.9	1.3
Nigeria 2010	66.8	66.6	–0.0
Senegal 2005	31.1	40.3	29.6
Botswana 2005	34.4	30.7	–10.8
South Africa 2006	15.9	11.6	–27.0

Source: Author's calculations.

–3.9 percent. The reductions in poverty are largest for the two country groups—high-income economies and low-income economies—that most diverge from their benchmark structural characteristics. Botswana, despite its high per capita income, still has nearly 40 percent of its labor force in agriculture, a sector in which nearly 50 percent of people are poor. South Africa has too few of its workers in manufacturing and too many in services. Poverty would be reduced substantially in Rwanda, Tanzania, Uganda, and Zambia with a further shift of labor out of agriculture into industry and services. In Mali, where the poverty rate in agriculture is relatively low and that in industry is relatively high, a structural change toward the benchmark would leave overall poverty unchanged.

In Ghana and Senegal poverty would have increased if structural change had been in line with the benchmark. Both countries have labor shares in agriculture and industry that are below the benchmark and service sector employment shares that are substantially above it. This means that the reallocation out of services in the simulation shifts the labor share in the direction of the sectors with higher poverty incidence. The effect is particularly striking in Senegal, where the differences in poverty between agriculture and the rest of the economy are very large. Both countries illustrate the limitations of being able to measure structural change only at the level of three broad sectors. Without a finer classification, it is not possible to distinguish between high-productivity and low-productivity subsectors in industry and services.

A New Strategy for the Last Mile

Despite almost two decades of good growth, Africa continues to confront a significant poverty problem. The evidence suggests that one cause of the region's lackluster pace of poverty reduction is its lack of structural change. To succeed in eradicating absolute poverty, African governments and their development partners need to develop a new, two-part strategy for faster poverty reduction. The first objective is to raise agricultural productivity. In the near term, poverty reduction in Africa's low-income economies will need to come mainly from income growth in agriculture. Structural change will take time. Many of the building blocks for higher productivity jobs are long-gestation investments in physical and human capital. An agricultural transformation can both reduce poverty directly and establish the necessary conditions for labor to shift out of agriculture.

The second objective is to pursue public actions that accelerate the movement of workers into higher-productivity, higher-wage jobs. Given the relatively large number of low-skilled workers in most African countries, the structural changes that can have the greatest impact on poverty must be toward sectors that are intensive users of low-skilled labor. While industry—and manufacturing in particular—has been the major driver of structural transformation in Asia, it has not featured prominently in Africa's recent growth story. Africa needs an industrial revolution. And fortunately for Africa, industry no longer needs smokestacks. In addition to manufacturing, tradable services and agro-based value chains offer new opportunities for poverty reduction through structural change.

Back to Basics: Raising Agricultural Productivity

Sixty percent of Africans work in agriculture, and because the region's population growth is so fast and its nonfarm sector is so small, in the near term an increasing number of Africans will have no choice but to earn their living by farming. In the short run, achieving more rapid poverty reduction will depend fundamentally on raising agricultural productivity. While Africa has suffered from underinvestment in new agricultural technologies—especially compared to Asia—there is substantial room for yield increases, even for traditional crops. Thus improving farm productivity offers the potential to directly reduce poverty, as it has done in China, India, and Vietnam, and to strengthen the basis for accelerated movement of labor into higher productivity sectors.

Over the past decade, improved agricultural technologies have played a minor role in output growth in many African countries. Only a small number of smallholders use drought-resistant plant varieties or improved seeds. A similarly small number use productivity-enhancing inputs such as fertilizer (Udry

2010). If the technology available to farmers permits high yields, and farmers choose not to use it, the most likely explanation is that it is not profitable. The price of output is low relative to the prices of inputs.

There is a need to improve rural roads, market access, and irrigation to increase the profitability of new agricultural technologies. Bad roads and poorly developed marketing systems inhibit innovation. Transport costs from the farm gate to primary and secondary markets are high. Poor roads have increasingly negative impacts on adoption of nontraditional inputs. Irrigation can reduce the impact of droughts and also help to enhance productivity through a stable water supply, but the total irrigated area is well below its potential size.

The overall deficit of agriculture and rural development investment in Africa has been put between US$20 billion and $40 billion annually (Kanu, Salami, and Numasawa 2012). Support to the sector by African governments has been far below the 10 percent of fiscal expenditures pledged in the Maputo declaration of 2003. African governments—especially those that have recently experienced significant new natural resources discoveries—need to use some of their increased fiscal space in agriculture. There is also an expanded role for donors. While donor commitments to agriculture have been rising since about 2007, they have not yet reached the share of total official development assistance of the mid-1990s (Page and Shemeles 2014).

Poor rural infrastructure and lack of access to markets are part of the innovation story but not the whole story. We know very little about what else constrains raising agricultural productivity in Africa. Four market failures are commonly thought to be relevant to farmers' decisions to adopt new technologies: credit constraints, lack of insurance, learning externalities, and lack of secure property rights. Any one of these market failures could lead to underinvestment by farmers in the adoption of best practices. Each of these explanations has different implications for appropriate public policy, but there is often insufficient evidence to conclude which constraint is binding (Udry 2010). Most African countries on average spend less than 0.7 percent of agricultural GDP on research (Karugia and others 2009). More money is needed, and more of it needs to be directed toward understanding the behavioral reasons that farmers shun potential yield improvements.

One option to increase agricultural productivity receiving increasing attention by African policymakers—sometimes over the objections of their development partners—is opening the sector to large-scale investors (Collier and Dercon 2009). There are numerous examples of recent investments in out-grower schemes across a wide range of countries that have succeeded in partnering smallholder producers with large foreign firms. Large firms are less susceptible to the types of market failures that affect smallholders, and by partnering with smallholders they can be an important catalyst for productivity growth. For

example, formal firms are less likely to face credit constraints or lack of access to adequate insurance. Larger organizations are better able to internalize the benefits of experimentation, allowing faster learning. As a result, a larger organization may be able to diffuse knowledge more effectively (McMillan 2013).

Transforming Manufacturing: The Investment Climate, Exports, and Clusters

Modern manufacturing has the potential to provide good jobs for large numbers of relatively unskilled workers, but rapid growth of manufacturing depends upon the rapid expansion of competitive firms. One set of public actions to support industrial development is largely noncontroversial. It includes mainly policies and investments directed at improving the investment climate—the regulatory, institutional, and physical environment within which firms operate. Indirect costs attributable to the investment climate are higher in Africa than in Asian competitors (Eifert, Gelb, and Ramachandran 2005; Dinh and others 2013). Given the range of investment climate reforms available to African governments and their development partners, however, too much attention has been paid to low-impact but easily measured reforms of business regulations and too little to infrastructure and skills (Page 2012a). Firm-level studies of productivity highlight infrastructure deficiencies as a significant barrier to greater competitiveness. Sub-Saharan Africa lags at least 20 percentage points behind the average for low-income countries on almost all major infrastructure measures. Electric power remains particularly scarce and unreliable (World Bank 2009). There has been little strategic orientation of Africa's infrastructure investments to support industrial development and, until quite recently, little willingness on the part of Africa's development partners to finance infrastructure.

Closing Africa's infrastructure gap will require around US$93 billion a year, about 15 percent of the region's GDP; 40 percent of total spending needs is for power alone (World Bank 2009). It is clearly unrealistic in the current fiscal environment to count on aid to fill the financing gap. New approaches and products are needed. Guarantee instruments could leverage limited donor financing by reducing the perceived risk of private debt financing for infrastructure. Greater cooperation and coordination between Development Assistance Committee donors and nontraditional donors, like China, can improve the focus and efficiency of resource use. The Infrastructure Consortium for Africa at the African Development Bank, if properly funded and used, could lead the effort.

Africa's skills gap with the rest of the world also constrains its ability to compete. Secondary and tertiary educational access and quality lag other regions significantly. Employer surveys report that African tertiary graduates are weak in problem solving, business understanding, computer use, and communication skills (World Bank 2007a). In manufacturing there is a strong link between

export sophistication and the percentage of the labor force that has completed postprimary schooling (World Bank 2007a). There is also evidence that manufacturing enterprises managed by university graduates in Africa have a higher propensity to export and that firms owned by university-educated indigenous entrepreneurs have higher growth rates (Page 2012a). Expanding postprimary education presents at least as daunting a challenge as closing the infrastructure gap. The current funding gap for education across Africa is estimated between US$6 billion and $29 billion (World Bank 2007b). DAC donor commitments to all levels of education in Africa approach only US$4 billion. Confronted with rising unit costs of primary education and limited prospects of external finance, it is time to replace the primary education MDG with a more broad-based measure of human capital.

Investment climate reforms alone, even broadly defined to include greater investment in infrastructure and skills, are unlikely to prove sufficient to meet Africa's industrialization challenge. Africa is a latecomer to the global market in manufactured goods. Rising real wages in China may offer an opportunity to break into global markets in low-wage goods (UNIDO 2009; Dinh and others 2013), but to succeed, African governments—and their development partners—will need to recognize two important realities. First, for the vast majority of African countries the export market represents the only option for rapid growth of manufacturing. Thus an effective strategy for the promotion of nontraditional exports is essential. Second, and closely related, manufacturing and service industries tend to concentrate in clusters, because of the productivity boost that such industrial agglomerations provide.

Africa needs an export push: focused public investment reforms, policy reforms, and institutional reforms that address the critical constraints to exporting. Here is an important role for regulatory reforms. Export procedures—including permits and certificates of origin, quality, and sanitation—can be burdensome. Duty drawback, tariff exemption, and VAT reimbursement schemes are often complex and poorly administered (Farole 2011). Because new entrants to the global trade in manufactures tend to specialize in the final stages of the value chain, improving trade logistics is essential. Value added in final-stage exports is low, amplifying the cost penalties imposed by beyond-the-border constraints to trade. African countries rank at the bottom of the World Bank trade logistics index, and poor trade logistics performance in coastal countries taxes landlocked neighbors (World Bank 2010a). The region ranks especially badly in trade-related infrastructure, but poorly functioning institutions and logistics markets also reduce competitiveness.

International support for an export push should consist of aid to improve trade logistics and policies to increase preferential market access. The Aid for Trade initiative has attracted considerable donor attention. As generously

defined by the donors, it makes up about 25 percent of total development assistance. But donors are not fulfilling the promise made at Hong Kong in 2005 to make Aid for Trade additional to existing aid budgets. In fact Aid for Trade's share in total development assistance has fallen steadily since 1996 (OECD 2010). Africa's export push will not succeed unless the international community keeps its promise of additionality. One way to improve trade policy in Africa is to reduce escalating tariffs targeted at higher-stage processing of exports. Here, China must play a leading role. Another step is to develop a simple, time-bound system of preferences for Africa's nontraditional exports to high-income countries. A sensible place to begin would be for the European Union and the United States to harmonize their individual preference schemes for Africa (the Economic Partnership Agreements and the Africa Growth and Opportunities Act).

Africa has few modern industrial clusters, making it both more difficult for existing firms to compete and more difficult to attract new industry. Governments can foster agglomerations by concentrating investment in high-quality institutions, social services, and infrastructure in a special economic zone. This has been one of the keys to the rapid growth of industry in China and Vietnam. In East Asia and Latin America, spatial policies have supported an export push through the creation of export processing zones (Farole 2011; Dinh and others 2013). Africa's experience with spatial industrial policy, however, has been largely unsuccessful. A recent review concludes that most African special economic zones have failed to reach the levels of physical, institutional, and human capital needed to attract global investors (Farole 2011).

Making Africa's special economic zones world class will be a challenge. It will require profound changes in management, including the recruitment of high-quality, business-oriented staff. Surveys of Africa's special economic zones document widespread failure by free-zone authorities to engage constructively in a dialogue with their private sector clients (Farole 2011). Significant upgrading of infrastructure both within and outside the zones is needed. Zone-specific changes in the regulatory regime affecting exports can be introduced to reduce the administrative burdens on exporters. Business support services, training, and skill-upgrading programs focused on the needs of zone-based investors can be introduced. To address the collective action problem, foreign direct investment policy can be designed to encourage a critical mass of investors to locate in a special economic zone within a short period of time.[3] Traditional donors have tended to neglect special economic zones. China, on the other hand—building on its own success with spatial industrial policies—has launched an initiative to

3. China has sponsored the development of five "official" special economic zones aimed at supplying the Chinese market. The Chinese government has not involved itself in the design or direct operation of the zones, but it has organized marketing events in China to promote investment in the zones.

promote the construction of export-oriented special economic zones in Africa (Brautigam and Tang 2011). Both governments and donors can learn from the Chinese experience.

Embracing New Options: Industries without Smokestacks

Major technological changes in transport and communications have broadened the range of options for growth-enhancing structural change. Industry no longer needs smokestacks: tradable services and some agricultural value chains increasingly share firm characteristics with manufacturing. With the exception of remote impersonal services, most industries without smokestacks are labor intensive and have mostly low-skilled jobs. And because they share many firm characteristics with manufacturing, the types of public policies needed to promote their rapid growth are similar.

Information and communications technology have made many services tradable that are high-value-added per worker (modern impersonal). The range of business processes that can be traded—processing insurance claims, desktop publishing, the remote management and maintenance of IT networks, compiling audits, completing tax returns, transcribing medical records, and financial research and analysis—is constantly expanding. Like manufacturing, these tradable services benefit from agglomeration, technological change, and productivity growth (Triplett and Bosworth 2004). Global trade in services has grown faster than trade in goods since the 1980s (Ghani and Kharas 2010). From 2000 to 2011 services exports from Africa grew six times faster than goods exports and are now about 20 percent of the total exports of the average non-resource-rich sub-Saharan African country (AfDB 2013).

The transport of fresh produce over long distances became possible with the development of refrigeration and cold-storage chains linking production and consumption points. Keeping products fresh (maintaining the cold-storage chain) and transferring them quickly from farm to shelf adds value. Value is also added through packaging, preparation, and innovation. The global agricultural value chain in horticulture—fresh fruit, vegetables, and flowers—is increasingly dominated by lead firms that coordinate vertical supply chains and have firm characteristics similar to modern manufacturing (Humphrey and Memedovic 2006). Led by Kenya, a number of African producers have succeeded in establishing niche markets in the production of cut flowers and out-of-season crops (Tyler 2005).

Africa has a strong comparative advantage in tourism. Sub-Saharan Africa attracted 33.8 million visitors in 2012, whereas in 1990 there were only 6.7 million. Receipts from tourism in 2012 amounted to over US$36 billion and directly contributed 2.8 percent to the region's GDP (Christie and others 2013). Tourist arrivals to Africa over the next ten years are forecast to grow

faster than the world average (World Bank 2010b). Tourism is an employment-intensive industry. There are 5.3 million direct tourism jobs across Africa, but its indirect employment effects are almost three times as large; the World Travel and Tourism Council calculates that the total direct and indirect employment impact of tourism in Africa in 2012 was 12.8 million jobs (WTTC 2012).

Improving infrastructure is as important for industries without smokestacks as it is for manufacturing. Backbone IT infrastructure is central to success in remote impersonal services. Economical and efficient transport and cold-storage chains are essential for horticulture. Half the wholesale cost of African fresh produce in European markets is represented by the cost of transport, storage, and handling. Road infrastructure—crucial to horticultural exports and tourism—has received scant attention. Africa's distance from tourism source markets creates an acute need for higher quality and more competitive air access. Despite having 15 percent of the world's population, the continent is served by only 4 percent of the world's scheduled air service seats (Christie and others 2013). A plethora of small and uneconomical national airlines limits the region's ability to compete in horticulture and tourism (World Bank 2010b).

Trade in services requires high-level cognitive and language skills, and the fastest growing services sectors are the most education intensive (Ghani and Kharas 2010). Policies to build human capital must be tailored to the tradable services that countries want to develop (for example, language skills are essential for call center and tourism markets). Africa has a comparative advantage over Asia in languages, because several important international languages are spoken widely, but relative neglect of postprimary education threatens its ability to compete in many language-based services. Education and training for tourism, both in language skills and in industry specific skills, are deficient (World Bank 2010b). Tourism training institutes often focus on hotel management, though the skills gap is in mid-level skills for hotel and restaurant operations (Christie and others 2013).

Tradable services and agroindustry can benefit as much as manufacturing can from an export push and from spatial industrial policies. Madagascar for example has had success in the development of the fresh vegetable industry through the creation of an export processing zone. The production of vegetables for export has now grown to include almost 10,000 smallholder farmers. Surveys indicate that these farmers on average have higher wages and greater income stability than noncontract growers (Minten, Randrianarison, and Swinnen 2009). In countries with unreliable public infrastructure, services export companies look for customized facilities, such as IT parks (World Bank 2010b). Governments such as Madagascar's and Mozambique's have developed special tourism investment zones (Christie and others 2013).

There are few examples—with the notable exceptions of Rwanda in remote services, Ethiopia in cut flowers, and South Africa in tourism—of African governments developing targeted strategies to promote services and horticultural exports. There are fewer examples still of successful spatial industrial policies to support industries without smokestacks. In part this reflects the general lack of policies in Africa designed to create an export push and support agglomerations, but it also reveals a failure to recognize the potential offered by these new activities.

Conclusions

In the last decade a large number of African countries have experienced moderately high growth in per capita GDP, buoyed by rising commodity prices, better macroeconomic management, and new natural resource discoveries. What is deeply worrying is that, in most cases of this growth, the impact on poverty has been limited. Africa has the lowest elasticity of poverty reduction with respect to per capita income growth and income inequality of any developing area of the world. As a result, completing the last mile in global poverty reduction represents a serious hurdle. In the relay race of poverty reduction, from China to India to Africa, the effort to end extreme poverty may fail on the last leg. Poverty is less responsive to growth and distribution changes in sub-Saharan Africa than in India or China at any poverty rate (Chandy, Ledlie, and Penciakova 2013).

Africa's failure to create enough high-value jobs in the face of a rapidly growing labor force is largely responsible. Lack of structural change has reduced the impact of growth on poverty reduction. There is scope to reverse this trend. To complete the last mile, new ideas and new investments by African governments and by donors will be needed. A two-part strategy for poverty eradication based on intensified agriculture and accelerated industrialization—with and without smokestacks—offers the best hope of Africa successfully finishing the last mile.

Appendix 7A

Table 7A-1. *Some Characteristics of the Benchmark Economies*[a]

Country	*GDP per capita, 2012 (current US$)*	*Rate of GDP growth per capita, 1990–2005*	*Poverty rate, most recent year*	*Change in poverty rate, 1990–2005*
Bangladesh	752	3.38	43.3	–1.8
Cambodia	944	5.72	18.6	–1.6
Chile	15,452	4.18	1.4	–8.2
China	6,091	9.19	11.8	–10.6
India	1,489	4.13	32.7	–1.7
Indonesia	3,557	2.81	16.2	–5.3
Korea	22,590	4.73	0.0	0.0
Malaysia	10,432	3.86	0.0	–8.8
Philippines	2,587	1.21	18.4	–2.2
Thailand	5,480	3.65	0.4	–19.6
Vietnam	1,755	5.98	16.9	–8.1

a. Change in poverty rate is for the period beginning and ending closest to 1990–2005. Data for Cambodia are for the period 1993–2005.

Table 7A-2. *Countries in the Structural Change and Poverty Reduction Regressions*

Asia	Malaysia	Africa	Nigeria
	Thailand		Senegal
	Indonesia		Kenya
	Philippines		Ghana
	China		Zambia
	India		Ethiopia
	Korea		Mauritius
	Vietnam		Malawi
			South Africa
MENA	Turkey		Tanzania
			Mozambique
Latin America	Brazil		Tunisia
	Argentina		
	Chile		
	Mexico		
	Venezuela		
	Costa Rica		
	Colombia		
	Peru		
	Bolivia		
	Guatemala		
	El Salvador		

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