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Structural Transformation in Employment and Productivity

What Can Africa Hope for?

*Louise Fox, Alun Thomas,
and Cleary Haines*

The Africa Department

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Contributors

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Overview

Experience has shown that growth in output alone is not enough to improve the welfare of the population. It is widely agreed that transformation of the economy from a fundamentally agrarian, subsistence one to an urbanized, integrated, enterprise-dominated one is the essence of economic development, and what sustains improvements in economic welfare. This has been the experience throughout the industrial world as documented by Duarte and Restuccia (2010). Moreover, since the work of Arthur Lewis in the 1950s structural transformation is generally considered a key element of economic development. Dating back to the initial analysis of Lewis (1954), the progress of this transition has been measured in output, productivity, and employment space.

Sub-Saharan Africa¹ has just completed one of its best decades of growth. Transformation of output is occurring as agriculture, the lowest-productivity sector, has declined as a share of GDP across the continent (despite increases in agricultural commodity prices, which pushed up the share in current prices). The share of higher-productivity sectors has increased as a share of GDP (*Regional Economic Outlook* Fall 2012). Yet poverty rates remain high. Dissatisfaction with economic outcomes is widespread (Afrobarometer 2013). Is this because Lewis-type transformation in employment is taking place too slowly?

The issue of structural transformation has recently received fresh impetus. Rodrik (2015) has argued that industrialization contributes to sustained growth through two channels: (1) the reallocation of workers from low-productivity activities to higher-productivity ones, and (2) the relatively stronger

¹The countries included as part of sub-Saharan Africa are shown in Appendix Table 1.

productivity growth experienced by manufacturing over the longer term. Indeed, he has shown that organized manufacturing exhibits unconditional productivity convergence (Rodrik 2015). For these reasons Rodrik suggests that a sustained period of structural transformation requires the development of the manufacturing sector. He notes, however, that over the past 20 years, the peak of manufacturing employment across countries has occurred at repeatedly lower employment ratios for this category (Rodrik 2015). Duarte and Restuccia (2010) support Rodrik's view by showing that productivity differences in agriculture and industry between advanced economies and developing countries narrowed substantially over 1956–2004, whereas productivity in services remained significantly lower in developing countries. McMillan and others (2014) argue that economic transformation is associated with an increasing share of employment in manufacturing and high-productivity services while Amirapu and Subramanian (2015), using India as a test case, caution against too much focus on the highest-productivity sectors because they employ too few people.

For sub-Saharan economies, previous work on this issue found that until the 2000s, output and employment in sub-Saharan economies had become more concentrated in low-productivity activities rather than switching to higher-productivity activities and moving up the productivity chain (McMillan and Rodrik 2012; hereafter MR). But since the beginning of the past decade, the picture changed, as employment shifted into higher-productivity activities, supporting nascent structural transformation (McMillan and Harrtgen 2014; de Vries, Timmer, and de Vries 2015).

The objective of this paper is to provide the most complete analysis of the structural transformation among low- and low-middle-income countries in sub-Saharan Africa. Previous global analysis has included only a few countries in sub-Saharan Africa (for example, MR included only eight countries in their global analysis; de Vries, Timmer, and de Vries 2015 included nine countries). The analysis in this paper covers over 30 countries, assessing the extent and speed of structural transformation in output, employment, and productivity in the past decade. The analysis shows that there was structural transformation in some sub-Saharan African countries during 2000–10 as well as convergence in sector productivities within countries, but this change took place through strong movement in the shares of labor and output out of agriculture into services rather than into industry. This shift lowered relative productivity in services, in part because much of the movement was into lower-productivity nonwage employment. Several factors have been cited to explain this, including lower wage costs, lower energy costs, and lower logistical costs (Eifert, Gelb, and Ramachandran 2008; Gelb, Meyer, and Ramachandran 2013). This paper argues that the sluggish pace of a demographic

transition in sub-Saharan Africa, which swelled the labor force, has played a major role as well.

The sub-Saharan Africa experience stands in contrast to that of the most recent low-income industrializers and transformers in Asia. Recognizing that the Asian experience of transformation through manufacturing may not be the only durable path, this paper nonetheless compares the recent experience of some transforming low-income Asian economies (Bangladesh, Cambodia, Vietnam) with fast-growing countries in sub-Saharan Africa.² The Asian countries experienced much faster shifts in the share of output and employment into industry. In east Asian countries, the share of employment in the highest-productivity sector (industry) grew rapidly through expansion of manufacturing wage employment. Growth in the industrial sector was so labor intensive that average labor productivity in industry *declined* relative to the economy-wide average. Agricultural productivity also improved (owing to both investments and labor shedding). The share of employment in the lowest-productivity sectors declined rapidly because of low labor force growth, meaning that there was much less labor for the economy to absorb.

Using updated output and employment projections, the analysis shows that the African trend can be expected to continue. Sub-Saharan Africa will not be able to transform through manufacturing as east Asia did over the past two decades. Continued gains are expected in average labor productivity for the low- and low-middle-income countries of sub-Saharan Africa, as well as a modest reduction in overall sectoral labor productivity dispersion in the economy, consistent with the historical experience of the Asian countries. But this will not produce east Asian-type employment transformation results, either in terms of type of employment (wage versus nonwage jobs) or in sector of employment (industry). In sub-Saharan Africa, the projections show that the combination of much larger labor force growth (implying that agriculture cannot shed labor as fast as it did in east Asia) and slow expansion of the tradables sector results in a slower movement of output and employment into manufacturing, as well as the continued development of a heterogeneous service sector, with both high- and low-productivity segments.

The paper is structured as follows. Chapter 1 reviews the key structural transformation trends in sub-Saharan Africa since 1990. It shows that the output and demographic transformations resulted in a relatively weak employment transformation by 2010. Chapter 2 shows what these trends meant for changes in employment and relative productivity in sub-Saharan Africa and

²Countries from this region are chosen because they experienced successful transformations with large increases in industry output and employment while they were still low-income countries. The only low-income country in Latin America is Haiti, but it has not experienced much structural transformation owing to political turmoil and the ongoing effects of natural disasters.

contrasts this development with selected fast-growing low-income Asian countries during the same period. Chapter 3 presents an output and employment projection for 2020 and an analysis of what this means for structural transformation. Chapter 4 offers some concluding thoughts.

CHAPTER

1

Output, Demographic, and Employment Transformation in Sub-Saharan Africa and Asia

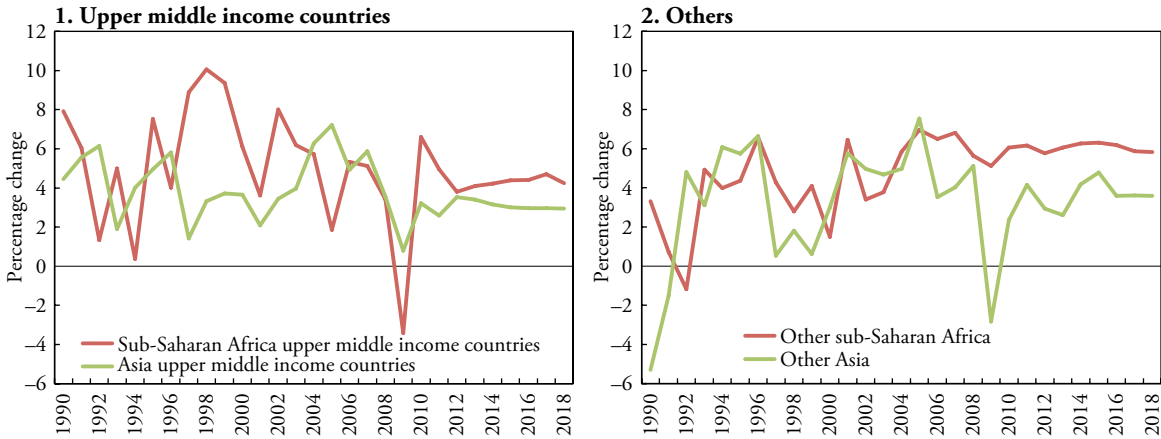
Structural transformation has become a widely used macroeconomic measure of the quality of the economic development process.¹ It is widely accepted that in order for it to happen, two processes have to be going on simultaneously: (1) a shift of GDP out of agriculture into modern industrial and service enterprises, and (2) following output, a shift in employment out of agriculture into the new nonagricultural enterprises, which necessarily involves migration and urbanization (economic densification). A demographic transition, resulting in a lower number of dependents and slower growth of the labor force, usually accompanies the output and employment transitions and facilitates the shift of the labor force as the growing modern sector can absorb a larger share of new entrants to the labor force when there are not so many entering.

Output

Since the mid-1990s, sub-Saharan Africa has had its longest continuous expansion in over 50 years. Economic growth averaged about 4 percent per annum among upper-middle-income countries and about 6 percent per annum among low-income sub-Saharan African countries. These growth rates surpass those of middle- and low-income Asia over this period (Figure 1). Moreover, during the recent financial crisis, the growth rate among low-income countries (LICs) in sub-Saharan Africa was broadly unaffected, in contrast to the sharp downturn among LICs in Asia.

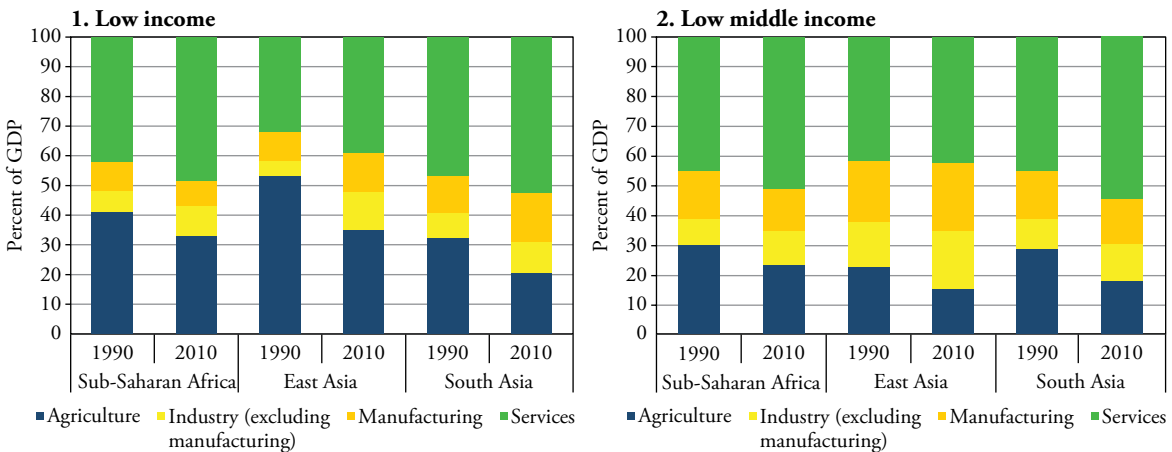
¹Obviously it is not the only measure used; other dimensions include the quality of institutions and the adequacy of levels of living and opportunity. But see the discussion in African Center for Economic Transformation 2014 as well as the fall 2012 *Regional Economic Outlook* for why the concept remains relevant.

Figure 1. Sub-Saharan Africa and Asia: Real GDP Growth



Source: IMF, *World Economic Outlook* Spring 2013.

Figure 2. Selected Regions: Development of Sectoral Output Shares



Source: World Bank, *World Development Indicators*.

However, even though the growth rate among sub-Saharan African economies has been very strong, the output structure of the economies has changed only moderately (Figure 2). Separating countries according to the level of per capita GDP in 2012, with threshold levels at \$1,025 and below for LICs and \$1,026–\$4,035 for low-middle-income countries (LMICs), shows that in both types of countries, agriculture is falling as a share of GDP by about 8 percentage points combined with a corresponding rise in the share of services. At the same time the aggregate industry share remained fairly flat and manufacturing represents only about 7 percent of output in low-income sub-Saharan African countries.

The economic structure has changed more swiftly among LICs in east Asia.² The agricultural share in these countries was higher at the beginning of the period than the share in sub-Saharan Africa, and fell by 15 percentage points of GDP. Moreover, in contrast to the experience in sub-Saharan Africa, the industrial sector made a large contribution to the output transformation. The manufacturing output share has risen by 4 percentage points in low-income east Asian countries and in the LMICs there, the manufacturing share continued to increase over the period. More important, in east Asian LMICs, by 2010, industry (including manufacturing) accounted for about one-third more output than in sub-Saharan Africa. The evolution of output shares in south Asia was closer to that of sub-Saharan Africa, especially in the LMICs (where India dominates).

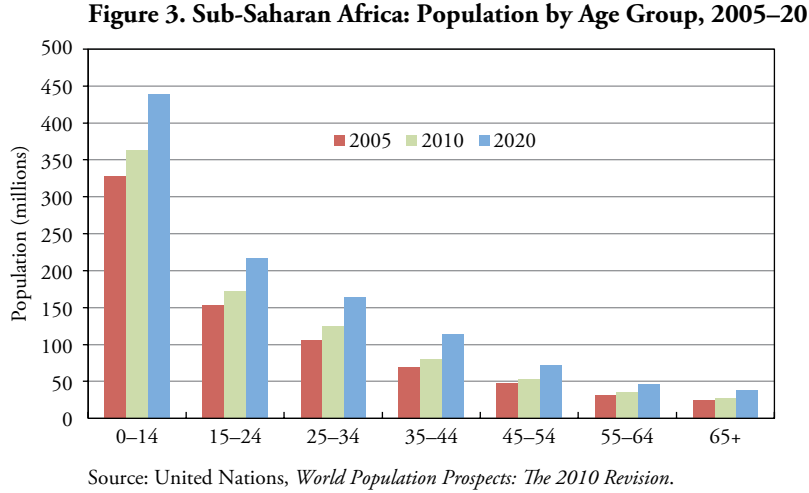
The low manufacturing output share is mirrored by the low share of manufacturing exports in total exports in sub-Saharan Africa. This assessment is based on two-digit industry export data from Comtrade.³ The share of manufacturing goods in the export basket of low- and low-middle-income sub-Saharan African countries is very low, at between 10 percent and 20 percent on average over the past two decades. For east and south Asian countries, manufacturing export shares have historically been much higher, although they did take a sharp hit in the LICs of south Asia during the global financial crisis. Thus, the industrial sector among LICs and LMICs in sub-Saharan Africa is less competitive than in Asia, and, for LICs, more dominated by nontradables such as construction (see shaded yellow area in Figure 2.1, left panel).

Demographics

Sub-Saharan Africa's demographic trends are also different; fertility is higher and the demographic transition is happening much more slowly. Between 2000 and 2010 the labor force grew at a rate of only 1.2 percent per annum in east Asia and 1.7 percent per annum in south Asia, but 2.6 percent per annum in sub-Saharan Africa. The median age in sub-Saharan Africa is 18—seven years younger than the median age in south Asia, which is the next youngest region (Figure 3). These population trends suggest that the number of youth entering Africa's working-age population will be rising for years to come. Between 2005 and 2020 the working-age population is projected to increase by over 200 million people, continuing the trend of the past decade. This trend is not expected to decline soon because a rapid, systematic reduction in fertility rates has yet to occur in sub-Saharan Africa. In the 1970s the fertility rate in Asia and Latin America was identical to the rate in Africa

²See Appendix Table 2 for the list of Asian countries.

³Data are available at comtrade.un.org/db.



today, but Africa’s fertility rate is falling much more slowly than in those regions at that time (Filmer and Fox 2014).

Employment Transformation

How does the sub-Saharan African employment pattern compare with other regions? The previous section contrasted the output transformation in sub-Saharan Africa with the one happening in east and south Asia, and found large differences, especially with east Asia. The employment transformation shows similar gaps, especially in the lower-middle-income countries. The employment structure was estimated for the following categories (a mix of sector and employment type):

- *Agricultural employment* – predominantly farmers working on small holdings and consuming a significant share of their production, but including more commercialized farmers as well. Wage work in agriculture as a primary activity is included in this category as well as fishing and primary forestry (collecting wood and other forest products).
- *Household enterprise (HE) employment* – unincorporated, nonfarm businesses owned by households. This category includes self-employed people running unincorporated businesses (which may or may not employ family or other workers) and family members working in those businesses.
- *Wage employment (industry or services)* – includes all labor force participants who report working outside the agricultural sector and receiving a payment for their work from an unrelated individual. It includes the public and private sectors. This category is divided into the industry and service sectors as the relationship between output growth and employment is expected

to differ. The former is more likely to be tradable, while the latter is more likely to be the public sector.

- *Unemployed* – labor force participants not in employment according to this paper’s broad definition.

These categories were chosen because the first two categories correspond to the Lewis-type “traditional employment” while wage employment is mostly, but not entirely, “modern” sector employment—the type of employment that should expand during a structural transition.

For the employment analysis, countries were divided up even further than in the output analysis presented in Figure 2. For comparison purposes, the upper-middle-income countries were included, and the resource-rich countries split out. The reason for the latter category is that resource-rich countries have a significantly different output–employment relationship than the non-resource-rich countries. The resource-rich countries are those whose ratio of resource exports to total exports was above 80 percent between 2008 and 2012, except for Botswana, which is categorized as an upper-middle-income country because of its high unemployment level.

The majority of Africans in low- and low-middle-income countries still worked in agriculture (either on their own family farm or as wage labor on other farms, or both) according to the regional estimated employment distribution in 2010 (Figure 4).⁴ For the LICs, this is not too surprising as the share of agriculture in GDP is still substantial. It is well known that the transformation in employment by sector always lags the transformation in output (more capital per worker is needed to employ people in more productive jobs).⁵ The high share of employment in agriculture in the LMICs is more surprising given the decline in the output share. Only in upper-middle-income countries has employment in agriculture almost disappeared.

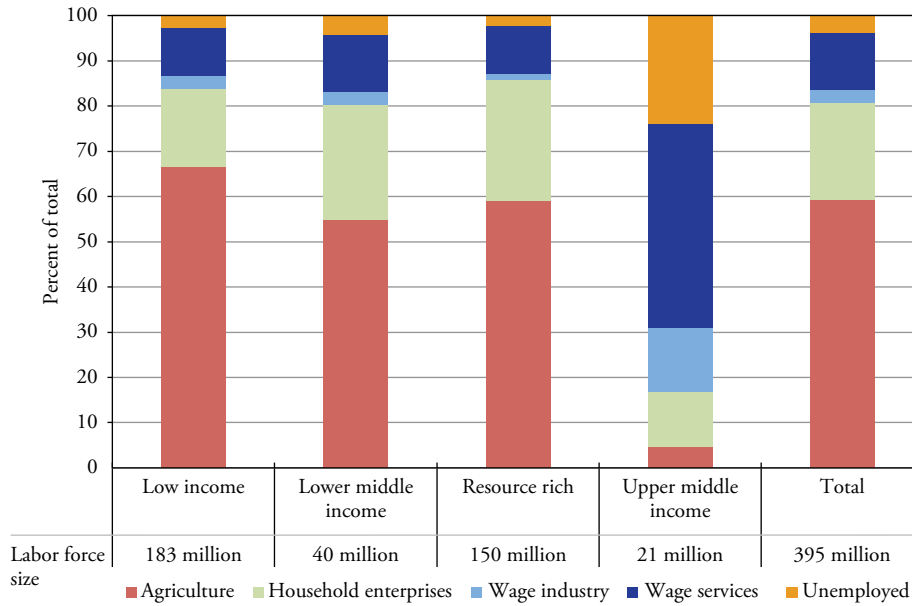
The next largest category of employment is household enterprises, which are unincorporated, nonfarm businesses owned by households. They include self-employed people running businesses that may employ family members without pay but also self-employed people who run a business that employs a small number of nonfamily workers on a casual basis. The vast majority (70 percent) of nonfarm enterprises today are pure self-employment—just the owner operating the HE. About 20 percent of these enterprises include a family member in the operation, and only 10 percent have hired someone outside of the family.⁶ Taken together, the analysis shows that 80 percent of

⁴For technical details on how the employment profile was created, see Fox and others 2013.

⁵One well-known demonstration of this point is found in Timmer 1988.

⁶See Fox and Sohnesen 2012 for an analysis of this sector in sub-Saharan Africa. Note that any paid nonfamily employee will be included in the category of wage employment.

Figure 4. Sub-Saharan Africa: Estimated Distribution of Employment by Country Type and Sector, 2010



Sources: Country household surveys; IMF, African Department database; and authors' calculations.

the labor force in 2010 was in household farms and firms—a segment commonly termed “the informal sector.”

To the extent that the employment transition consists of moving labor to the nonfarm wage employment segment, by 2010 most sub-Saharan African countries had not made much progress.⁷ Mirroring the output transformation, of the roughly 15 percent of the labor force in the wage sector in 2010, most were found in the services sector. Two types of wage employment — “formal” wage employment (where the employee has a contract and may be entitled to social protection), and “informal” or casual wage employment—are grouped together because most of the data sets do not allow a consistent disaggregation of wage employment into these categories. However, using a subset of countries, it was estimated that in the LICs and LMICs, about half of all nonfarm wage employment was in formal jobs.

Comparing sub-Saharan Africa to other regions using *only sector of activity*, shows that at similar levels of income, Asian countries have more employment in industry and less employment in agriculture (Figure 5). For this comparison, data from the Groningen sector database were used (de Vries,

⁷Non-farm wage employment includes all labor force participants who report working outside the agricultural sector and receiving a payment for their work from an unrelated individual. It includes the public and private sectors.

Timmer, and de Vries 2015); this contains a smaller set of sub-Saharan African countries than is shown in Figure 4, but a robust set of Asian countries. The agricultural sector charts reveal a reduction in the share of the labor force in agriculture in Asian economies as they advanced, but not a strong relationship in sub-Saharan Africa. Workers leaving the agricultural sector end up in both industry and services, but the share of employment in industry is much greater in Asia than in sub-Saharan Africa for a given level of GDP per capita. This picture also mirrors the output changes shown in Figure 2.

To compare regional performance on the basis of the distribution in Figure 4 (sector and employment type), the comparison sample was restricted to the few benchmark Asian countries (see Appendix Tables 2 and 4 for a GDP per capita comparison and final country list). Unfortunately, lack of employment data for the south Asian countries restricts the employment comparison to the east Asian economies plus Bangladesh.

An assessment of employment ratios across countries using the sector and employment type categories reveals that the differences between low-income sub-Saharan African and Asian countries are not stark. The share of the labor force in agriculture is not unusually high in sub-Saharan Africa, since Cambodia and Lao P.D.R. (countries with 2012 GDP per capita values ranging from \$1,000 to \$1,400) still have 50 percent or more of their labor force in agriculture (Table 1). Sub-Saharan African low-income countries are substantially poorer than this, on average, so the share of employment in agriculture is expected to be higher. The share of employment in HEs is actually smaller in sub-Saharan Africa than in the comparator countries, again reflecting lower income in sub-Saharan Africa. But in the LMICs, the differences become more obvious. The ratio of the employment share to the GDP share for agriculture in LICs in sub-Saharan Africa was 2.3 in 2010, while it was

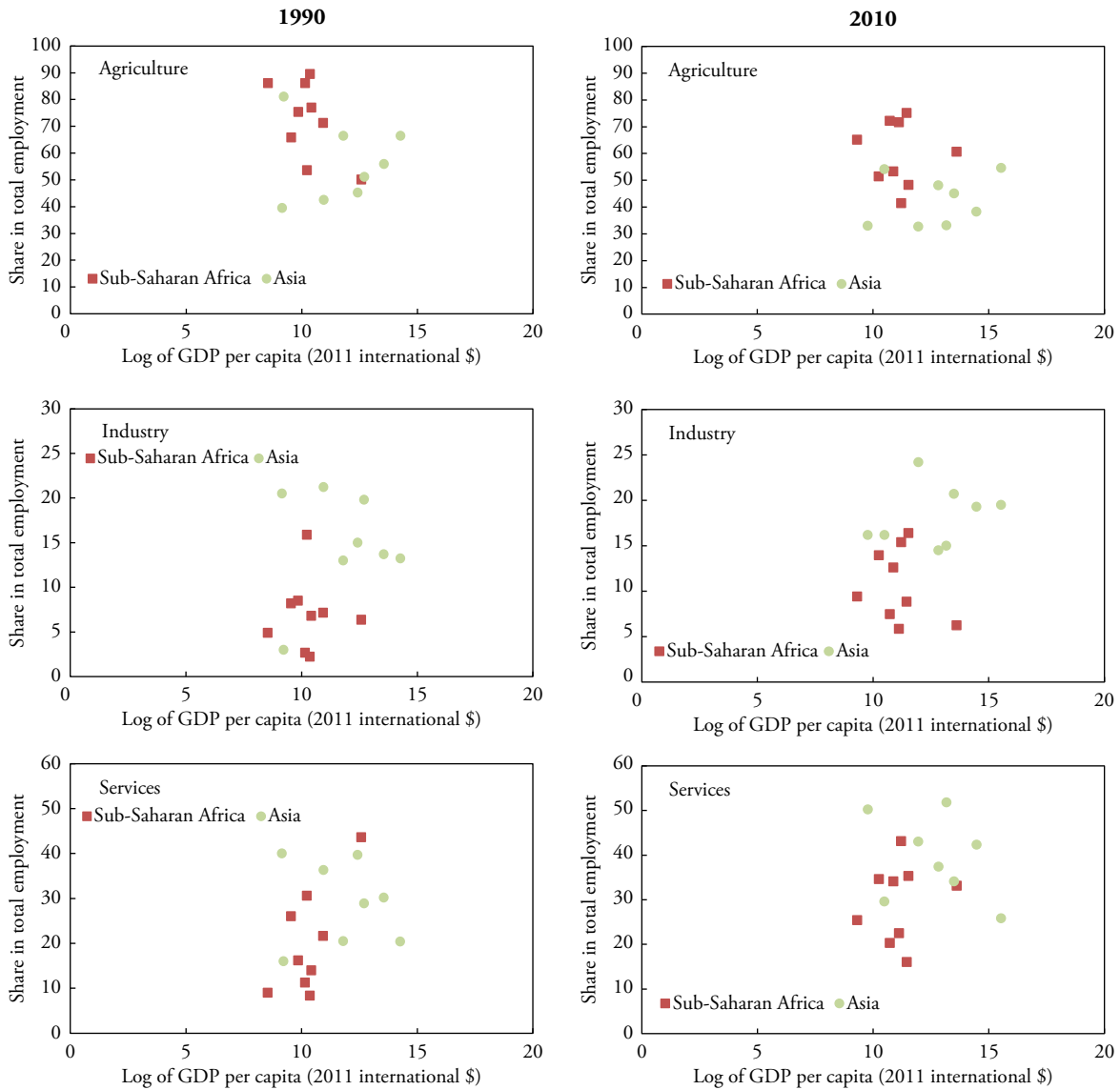
Table 1. Sub-Saharan Africa and High-Growth Comparators: Employed Population Ages 15–64, 2010 (Percent)

Income level	Region/Country	Wage			Household	Agriculture	Total
		All	Industry	Services	Enterprises		
Low-income	Sub-Saharan Africa	13.3	2.6	10.7	18.2	68.5	100.0
	Lao P.D.R.	13.5	5.4	8.1	19.0	67.5	100.0
	Bangladesh	25.7	10.8	14.9	27.7	46.6	100.0
	Cambodia	23.3	11.1	12.2	21.0	55.7	100.0
Low-middle-income	Sub-Saharan Africa	13.4	1.8	11.6	29.1	57.5	100.0
	Vietnam	31.8	14.3	17.5	19.1	49.1	100.0

Source: World Bank, International Income Distribution Data Set (I2D2); and authors' calculations.

Note: See Appendix Table 1 for details on country data sources and Appendix 1 in Fox and others 2013 for details on the surveys analyzed.

Figure 5. Sectoral Shares of Employment Low- and Low-middle-Income Countries, 1990 and 2010



Sources: Groningen Growth and Development Center (GGDC) 10-Sector database; de Vries, Timmer, and de Vries (2015); and World Bank, World Development Indicators.

2.4 in Bangladesh. But for sub-Saharan African LMICs, the same ratio was 3.4, much higher than in the comparator countries. Agricultural productivity is higher in the Asian countries as well, which has helped to reduce rural poverty to well below sub-Saharan African levels (*Regional Economic Outlook* Fall 2012). Labor is also more concentrated in the HE sector in LMICs in sub-Saharan Africa.

The low share of the labor force working in *private industry* is what makes the employment structure so different in low- and low-middle-income countries of Africa compared with the rapidly growing countries of Asia (Table 1). All the comparator countries have a larger share of employment in industrial wage jobs, because they have a high number of manufacturing jobs. Clearly the importance of agricultural commodity and mineral rents (as opposed to industrialization) in raising the per capita incomes of sub-Saharan African low-middle-income countries contributes to this discrepancy. Resource-rich countries in sub-Saharan Africa have not created much private wage employment at all. Unlike the low- and low-middle-income non-mineral exporters, the majority of the wage employment in resource-rich countries is in the public sector and high resource rents can create an economic structure unfriendly to private sector labor-intensive industry (Filmer and Fox 2014).

The lack of jobs in export-oriented manufacturing is not the only factor setting Africa apart. As discussed, a sluggish demographic transition means that the labor force is growing much faster in Africa than in Asia or Latin America. This lack of demographic transition complicates the employment transformation, because even with non-agricultural, modern private sector enterprise growth as rapid and labor intensive as occurred in the past 20 years in east Asia, a similar employment transition could not occur in sub-Saharan Africa. The enterprises would not be able to absorb the same share of the labor force because the labor force would be too big. For example, because Vietnam's labor force grew at only two-thirds of the pace of Senegal's over the past decade (2.1 versus 3.1 percent per annum), every dollar invested in creating labor-intensive manufacturing jobs will have a stronger effect on the structure of employment (measured as a share of the labor force) in Vietnam than in Senegal. In other words, Senegal needs 50 percent more investment in manufacturing than Vietnam needed just to bring its share of employment in industry to the level of Vietnam. In addition, the higher dependency level can be expected to result in lower private savings, reducing capital available for investment in the modern sector.

In sum, by the end of the past decade, the output transformation appeared to be underway, but moving toward services, not toward industry. The employment structure, however, reveals that looking at the output transformation only by sector in sub-Saharan Africa is deceptive. A large share of the growth in nonfarm employment was in household enterprises, not in the modern industrial and service enterprises that are expected during structural transformation. And the majority of Africa's labor force still worked in its least productive sector—agriculture—which had yet to experience the substantial productivity growth seen in rapidly growing economies outside Africa. Meanwhile, the demographic transformation was also lagging the output

transformation, which made it difficult to transform the employment structure quickly.

Transformation and Productivity: Comparison with Asia

Productivity Transformation

The employment and output data were combined to make assessments of the speed of structural adjustment in sub-Saharan Africa compared with Asian countries, through the productivity lens. The process of structural transformation—a cause and consequence of growth—necessarily generates increases in average labor productivity, resulting in higher earnings per worker. This happens either through gains in productivity in individual sectors—which can increase or decrease the average productivity dispersion in the economy depending on which sector gains relative to the others—or through workers moving from low-productivity activities to higher-productivity activities. The latter channel generates a more inclusive growth process, as the share of workers at the bottom of the earnings distribution begins to shrink.

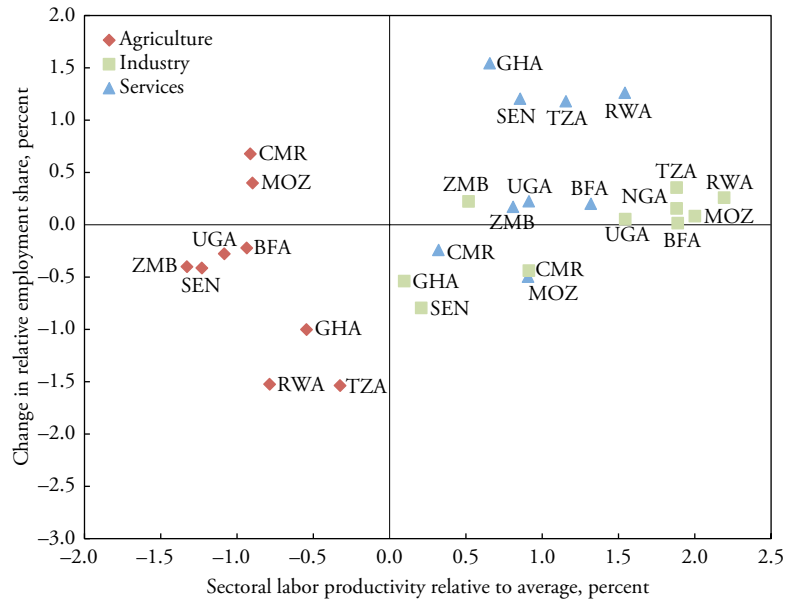
Previous work on the issue of productivity convergence has shown that in almost all economies, agriculture is the lowest-productivity sector, followed by services, with industry as the highest-productivity sector (Bah 2013; McMillan and others 2014). In terms of relative country comparisons, de Vries, Timmer, and de Vries (2015) have shown that the productivity level in manufacturing in Africa has deteriorated slightly relative to the United States since 1990, whereas for Asian countries the long-term trend has been flat. This paper's analysis for selected countries in sub-Saharan Africa for the past decade supports some of the literature, but unlike these authors, it excludes upper-income countries and focuses only on low- and lower-middle-income countries.¹

¹As discussed on page 9, the resource-rich countries have a different growth pattern, with little private sector job creation. But they remain in the analysis for contrast.

The comparative analysis of the productivity transformation starts with the labor reallocation element. Figure 6 plots initial period sector productivity levels relative to the economy-wide average against changes in the sectoral employment share. Countries transforming show the share of employment contracting in the lowest-productivity sector, agriculture (point in the lower left-hand quadrant), and employment expanding in relatively higher-productivity sectors (points in the upper right-hand quadrant). In most countries, the level of productivity in the industrial sector is above all other sectors (Zambia being an exception), but unfortunately for these African countries, there has been little shift of the employment share into this sector because all of the data points for industry are straddled close to the horizontal line. Employment in the industrial sector has grown only at about the rate of growth of the labor force (which represents good employment growth, but not transforming growth). The employment shift out of agriculture has predominantly gone to services. This is especially the case for Ghana, Rwanda, Senegal, and Tanzania, with annual increases in the employment share of between 1 percent and 2 percent. This shift generated some employment transformation, but not as much as might have been hoped given the growth rates. The modest performance of industry in absorbing employment is, however, consistent with the view that the influx of capital to finance industrial activities remains weak among sub-Saharan African economies. Obviously, the highest-productivity sector needs the most capital and technology to expand.

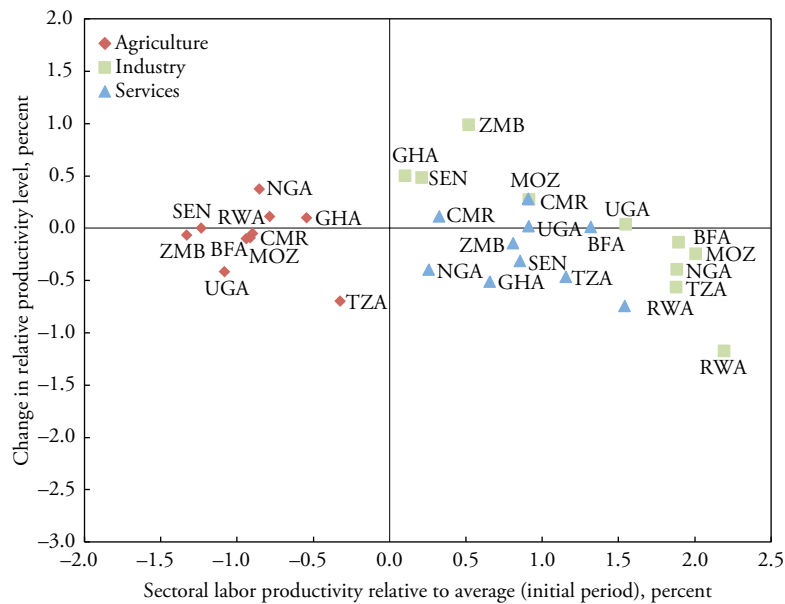
Figure 7 shows the relative productivity shifts. Agriculture would be expected to appear on the left-hand side, because initial productivity was low. If employment declined rapidly enough, this combined with positive sector growth should lead to a positive change in relative labor productivity and the country would appear in the upper half; if not (or if productivity growth in the other sectors was so dramatic that agriculture was still behind), the country would show up in the lower half. In these sub-Saharan African countries, agriculture labor productivity has improved slightly relative to other sectors, although there are a lot of observations around zero, and in a few countries relative productivity fell because the other sectors gained faster. The more troubling feature is the high gain in relative productivity in industry in some countries. While some absolute gain in productivity may be desirable, what is not ideal is for industry to pull away from the other sectors. As Timmer (2008) shows, this necessarily leads to lower labor absorption. Nigeria is one country that shows substantially declining relative labor productivity in industry, reflecting the diversification of this still small sector of the economy away from highly capital-intensive mining. Services meanwhile had a decline in productivity relative to the average, which is to be expected given the expansion of lower-productivity self-employment, which is where the majority of the employment transformation happened.

Figure 6. Selected Countries: Labor Productivity and Changes in Employment Shares: 2000–10



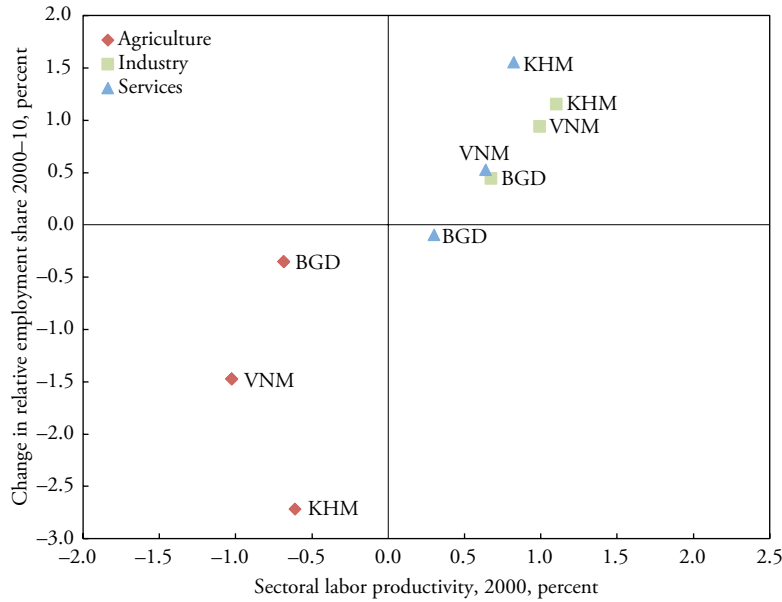
Sources: County household surveys; African Department database; and author's calculations.
Note: See appendix table 3 for country abbreviations.

Figure 7. Labor Productivity and Changes in Relative Productivity Level, 2000–10



Sources: County household surveys; African Department database; and author's calculations.
Note: See appendix table 3 for country abbreviations.

Figure 8. Low Income Asian Countries: Labor Productivity and Changes in Employment Shares, 2000–10



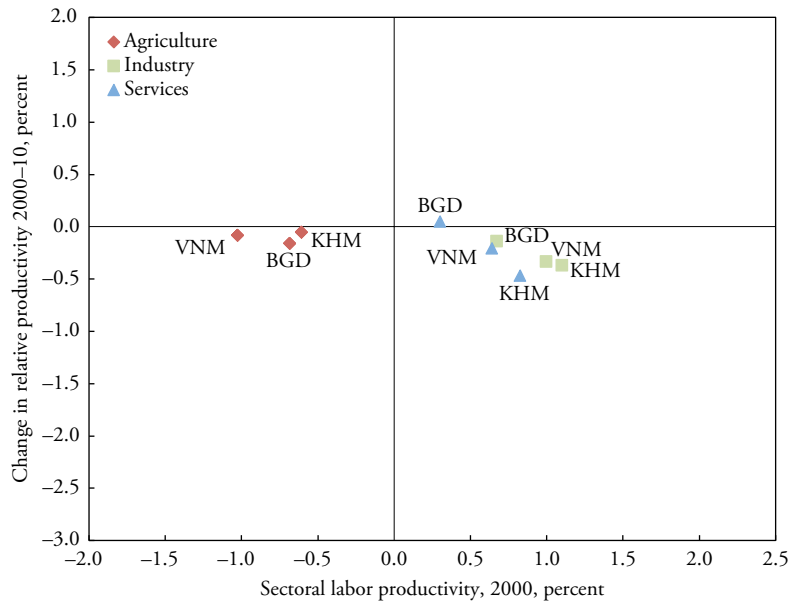
Sources: CEIC Asia database; and author's calculations.
 Note: See appendix table 3 for country abbreviations.

How does the historical experience of the African countries compare with the performance of the low-income Asian economies? Historical data for Bangladesh, Cambodia, and Vietnam over the 2000–10 period (Figures 8 and 9) reveal the strength of employment growth in industry and services for the south and east Asian countries relative to average growth.

The change in employment shares for both industry and services for these countries is higher than for almost all of the sub-Saharan African countries with the exception of services employment growth in Ghana, Senegal, Rwanda, and Tanzania (Figure 8 compared with Figure 6). This result was possible for a variety of reasons:

- There was a very labor-intensive pattern of growth in industry, with annual industry employment growth rates between 6 and 8 percent for Bangladesh and Vietnam and almost 20 percent for Cambodia. This compares with an average employment growth rate of 4 percent per annum for low-income countries with limited natural resources in sub-Saharan Africa.
- A much lower labor force growth in the Asian economies meant that a lower share of labor got stuck in agriculture.

Figure 9. Low income Asian Countries: Labor Productivity and Changes in Relative Productivity Level, 2000–10



Sources: CEIC Asia database; and author's calculations.

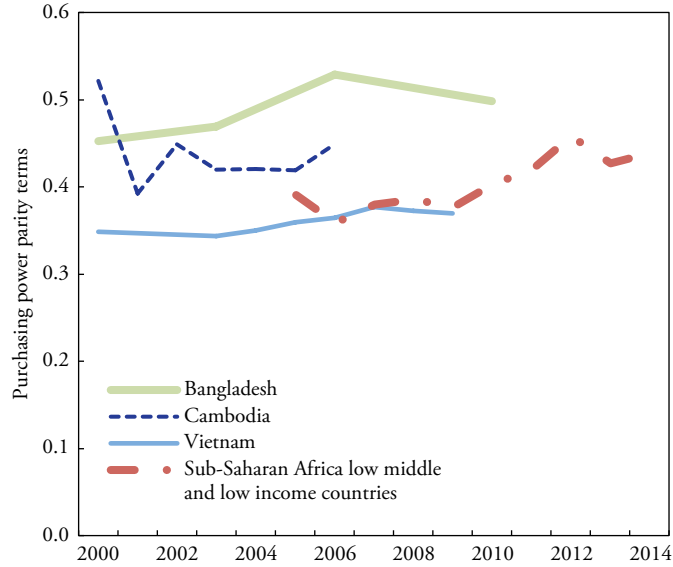
Note: See appendix table 3 for country abbreviations.

- Even though overall productivity rose rapidly, the strongly labor-intensive growth in industry and services actually dragged down relative productivity slightly in these sectors (the data points for these sectors are found in the lower right-hand side of Figure 9).

These patterns have led to a *convergence* in relative productivities between sectors in the east Asian countries. Countries with stronger employment growth (Cambodia, Vietnam) have experienced a larger relative decline in productivity in the sectors with strong growth. In addition to the strong employment performance, convergence in productivities between the sectors also helps lower overall income inequality if earned income is a large share of household income and earnings are related to labor productivity.

What explains why so many jobs were created in the industrial sector in the Asian comparator countries? One factor is not a difference in productivity levels across countries (Figure 10). For the productivity level comparison, sector outputs are expressed in a common currency by using 2010 purchasing power parity (PPP) exchange rates. The resource-rich countries are excluded to limit the effects of differences in industrial structure on the analysis, but LICs and LMICs are combined. The use of PPP exchange rates allows the productivity estimates to be expressed in a common unit and adjusted by

Figure 10. Selected Countries: Industry Productivity



Sources: CEIC Asia database; IMF staff estimates; and Fox and others 2013.
 Note: See table 1 for the list of country members in each group.

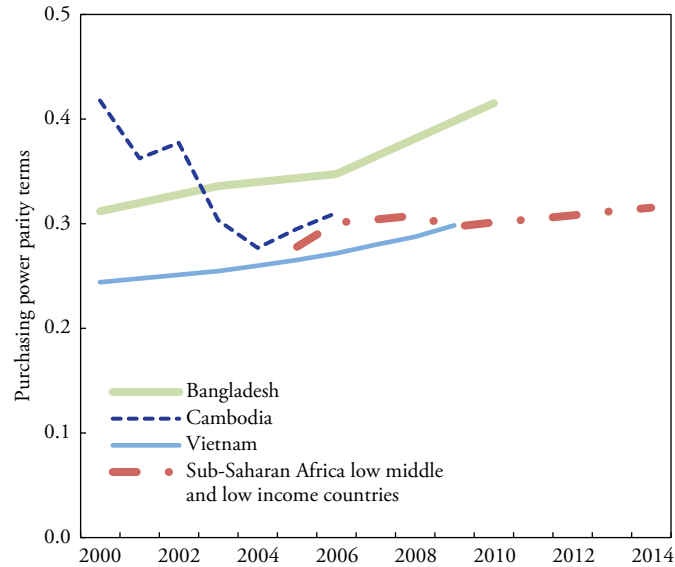
differences in prices over time. The basic assumption is that the real exchange rate is driven by differences in prices.²

In both industry and services, the levels of productivity in a common currency are very similar between the Asian countries and the non-resource-rich LICs and LMICs in sub-Saharan Africa, with only Bangladesh having a slightly higher level of productivity (Figures 10 and 11). It appears that the ability of the Asian economies to attract large amounts of foreign direct investment (FDI) and generate so much industry employment must lie elsewhere in terms of lower wage costs and other logistical factors.^{3,4} These results differ somewhat from the picture presented in de Vries, Timmer, and de Vries (2015) and Rodrik (2015), and may reflect differences in the composition of the Asian countries since the other analyses include the highly productive Asian emerging markets and are limited to manufacturing rather than industry.

²There has been some argument that the use of aggregate PPPs is incorrect because of differences in relative prices between sectors, but since these are estimated with such wide error margins, using the aggregate PPPs is preferred.

³See Eifert, Gelb, and Ramachandran 2008 for a discussion of these factors.

⁴The figures on the level of productivity are confirmed by independent estimates from the U.S. Conference Board, which show that aggregate productivity in Vietnam and Cambodia is about a fifth of the level in South Africa.

Figure 11. Selected Countries: Services Productivity

Sources: CEIC Asia database; IMF staff estimates; and Fox and others 2013.
Note: See table 1 for the list of country members in each group.

In sum, between 2000 and 2010, the share of employment in the more productive sectors expanded rapidly in Asian LICs and LMICs, explaining the rapid structural transformation observed in these countries. In Africa, the transformation was more muted because the relative share expanded in services rather than industry. In most sub-Saharan African countries, sectoral productivity differences did not widen very much; few countries appear in the upper quadrant of Figure 7. But it is noteworthy that in the Asian comparators, the sectoral productivity differences narrowed.

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Projecting Output, Employment, and Productivity Forward through 2020

This chapter uses the previously developed output and employment projections and analyzes what they mean for medium-term structural transformation in sub-Saharan Africa. The methodology for the projections is described in Fox and others 2013; the projected output and employment structures are briefly reviewed here.

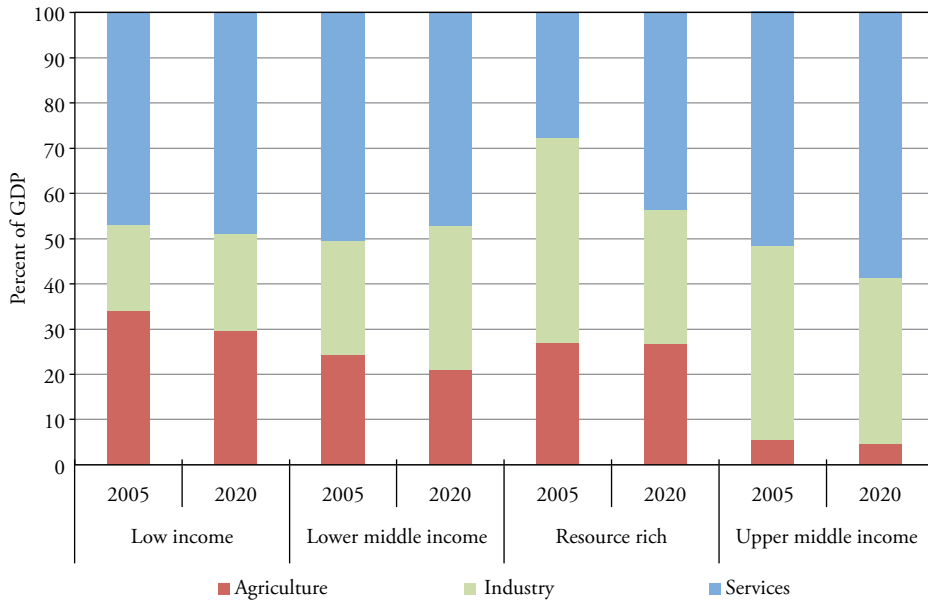
The projected sector output distributions reflect a pattern of continued strong growth in all country groups, with a sharp decline in the agricultural output share for all except resource-rich countries (Figure 12). The resource-rich and lower-income countries are projected to maintain their recent growth patterns of above 6 percent per annum growth, with lower-middle-income countries not far behind. The industrial sector is projected to grow at 7 percent per annum in low- and low-middle-income countries. This shows some optimism about output transformation (for example, growth in sectors such as construction and agro-processing), but it also reflects resource discoveries coming online. In the resource-rich countries, the service sector is projected to grow very rapidly, with agriculture remaining fairly stable.¹

The projected employment distribution corresponding to the output growth pattern shows little change from the current structure (Figure 13 compared with Figure 4).² With the majority of new jobs created in countries currently classified as low income (such as Democratic Republic of the Congo and Ethiopia), the agricultural sector remains important for creating employment. Stronger growth in other sectors could push this estimate down slightly, but it is unlikely that the labor force in agriculture will shrink over the next

¹These projections were prepared before the collapse of oil prices in 2014–15. Overall growth will most likely be lower in the resource-rich countries, reducing the growth of public sector wage employment in services, with knock-on effects on earnings in the household enterprise sector. The structure of employment was not expected to change much, however, so the employment projection is still valid.

²As discussed in Fox and others 2013, an elasticity model was used to generate these employment projections.

Figure 12. Sub-Saharan Africa: Sectoral Share of GDP by Country Type, 2005–20

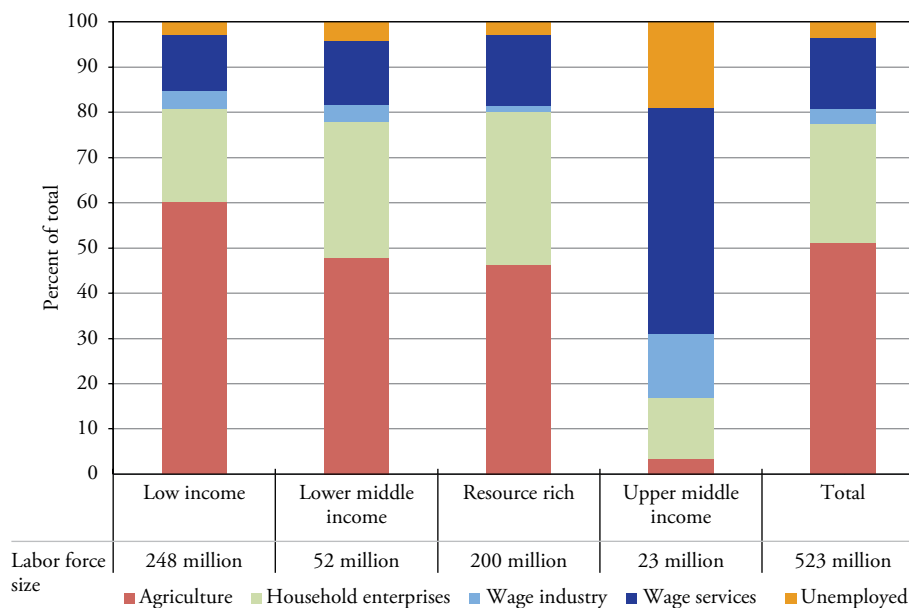


Source: IMF, African Department database 2013.

decade—young people seeking jobs will simply have no other option. If African agriculture realizes its potential, however, agricultural jobs could be more productive, higher-earning jobs.

A major factor in the slow-moving employment distribution is the very high growth rate of the labor force. Indeed, the share of industrial wage jobs in total employment rises only from 2.3 to 3.2 percent because the jobs are growing from such a small base relative to the projected increase in the labor force. Moreover, even though the industry growth rate is promising over the next decade among LICs, the growing importance of resource exports in this sector means that the share of industry wage employment in the total remains at less than 3 percent. The sector that is growing fastest among LICs is household enterprises, with the share projected to rise by 4 percentage points to 22 percent of employment. This expansion is mainly in the service sector (reflecting the output changes shown in Figure 12).

Taking the output and employment estimates, projected productivity changes are analyzed for low- and middle-income countries. The median estimate of labor productivity growth for LICs over 2010–20 is 2 percent per annum and varies between a low of 1 percent per annum for Benin, Mali, and Senegal to about 4 percent per annum for Rwanda and Sierra Leone. By historical standards for sub-Saharan Africa, this is very ambitious, although given the recent growth performance, it might be possible.

Figure 13. Sub-Saharan Africa: Estimated Distribution of Employment by Country Type and Sector, 2020


Sources: Authors' estimations.

A major element of structural transformation is the movement of workers from low-productivity to more productive activities. The split in total growth in labor productivity between within-sector productivity movements and changes in employment composition can be measured by the Shapley decomposition. This method splits the change in labor productivity between the change in sectoral labor productivity at initial employment shares (the first term in the following formula) and the change in the employment shares at the levels of productivity at the end of the period (the second term):

$$\Delta Y_t = \sum_{i=1}^n \theta_i(t-k) \Delta y_{it} + \sum_{i=1}^n y_{it} \Delta \theta_{it}$$

where ΔY is the change in aggregate labor productivity between the start and end point, Δy_i is the change in sector i productivity, and θ_i is the employment share in sector i .

While some might view these employment projections as pessimistic, analysis of the employment structural change underlying the projections reveals that they are actually highly optimistic. Using the formula reveals that about 63 percent of the expected *average* productivity change is accounted for by within-sector productivity changes and 37 percent by movements across sectors (structural transformation in employment). Not only is this figure higher than the historical pattern in Africa, it is also considerably higher than that found by MR for east Asia between 1990 and 2005. They calculate that the

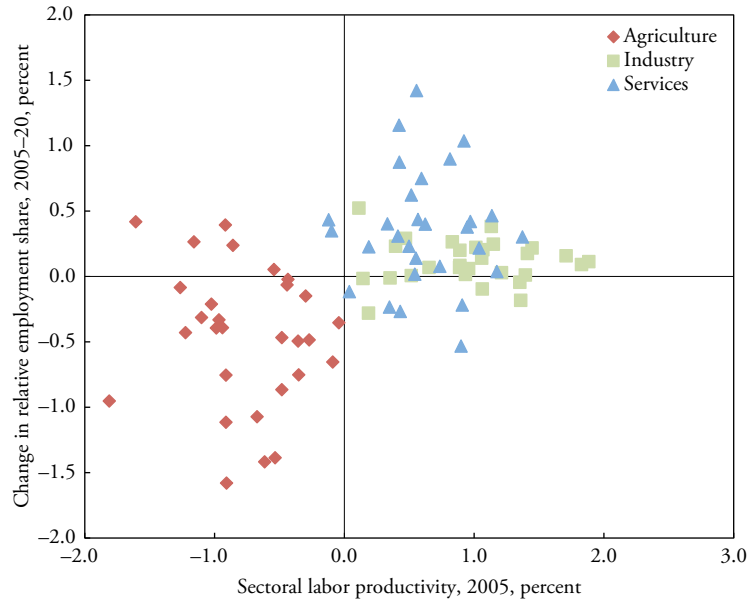
between-sector productivity movements for Asia accounted for only 15 percent of the total productivity gain (estimated at a very high 3.9 per annum) over the 1990–2005 period. Similarly, Saccone and Valli (2009) have found that China’s development has had little to do with reallocation across sectors, while for India, the structural change component is 33 percent, similar to the estimates enumerated here for the sub-Saharan African countries.

Therefore, while there remains considerable leeway to raise productivity growth over the medium term in sub-Saharan Africa, *analysis of the projections here shows that there are limits to how much can be achieved through labor reallocation, if that reallocation puts more employment in the service sector and the household enterprise sector*, rather than in industry as in east Asia. According to Rodrik (2015), today industrializing countries can expect the share of employment in manufacturing to peak at about 15–18 percent of total employment. But no low- or low-middle-income sub-Saharan African countries have a manufacturing employment share anywhere near that; in most countries the share is below 5 percent. In addition to attracting the private investment needed to grow the manufacturing sector, sub-Saharan Africa must also strengthen efforts to raise within-sector productivity in order to continue a strong growth performance into the next decade.

How would relative employment and productivity change amid an environment of overall productivity gains and employment shifts? Overall, relative employment data points are located in the “transformation” quadrants—the lower left for agriculture and the upper right for the others (Figure 14). But most of the employment transformation shifts come from services again. The corresponding figure for the relative change in productivity shows that, except for outliers, the change in agricultural productivity hovers around zero while the change in productivity for industry and services is generally negative, reflecting high labor absorption (Figure 15). The industry outliers are mostly resource economies where an output surge in the mining sector generates little employment and raises sector average productivity.

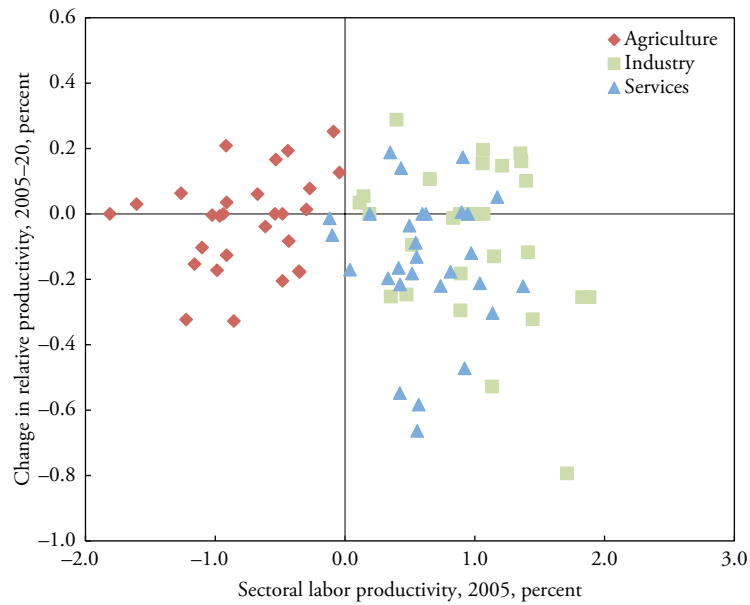
In sum, the fairly static transformation picture shown in Figures 12 and 13 actually reflects a very optimistic underlying dynamic. But this dynamic produces little net effect because over the past decade and a half, the population has been getting younger and the labor force has been growing rapidly. So, although strong output growth is projected to continue in many sub-Saharan African countries, the net effect will still leave most of the labor force in low-productivity employment.

Figure 14. Sub-Saharan Africa: Labor Productivity and Changes in Employment Shares: 2005–20



Sources: Fox and others 2013; and IMF staff estimates.

Figure 15. Labor Productivity and Changes in Relative Productivity Level, 2005–20



Sources: Fox and others 2013; and IMF staff estimates.

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Conclusion

Structural transformation in output and employment in sub-Saharan Africa has become a major concern of development economists. This is because analysis of past trends suggests that while the output transformation has been progressing, the employment transformation has been disappointing in terms of the creation of wage jobs, especially in low-middle-income countries, despite strong output growth performance. Much of the previous analysis used data on only a few countries, and therefore was biased toward middle-income countries outside of sub-Saharan Africa. This paper used a much more inclusive data set, and benchmarked sub-Saharan African performance over the past decade in output, employment, and productivity space against fast-growing Asian countries using continent-wide estimates of employment and output. It has also distinguished between wage and self-employment (household enterprises) in industry and services.

The analysis shows that a major, and often underappreciated, factor behind the slow employment transformation in sub-Saharan Africa compared with the Asian benchmarks was demographics—a labor force growing much faster in sub-Saharan Africa. But another factor was the importance of the mining sector in the growth and employment patterns of sub-Saharan Africa’s industrial sector, and weak productivity in the service sectors because of the high share of household enterprises. Sub-Saharan Africa has a large labor productivity dispersion within the services sectors, including a highly productive financial sector but a number of low-productivity household enterprises in the trading and personal services sectors. Looking forward to 2020 and using optimistic assumptions on output growth, the prospects are good for overall productivity growth in the region. But the employment absorption in the nonagricultural sectors will occur mainly in the services sector and nontradables industrial sector (construction, utilities) rather than in manufacturing.

Could sub-Saharan Africa develop a growth pattern that transforms the economy more rapidly? This is possible if the movement from agriculture into services can generate large improvements in value addition. Benchmarking the projected structural employment shift in sub-Saharan Africa against what east Asia achieved historically shows that sub-Saharan Africa falls short in terms of the development of manufacturing employment. But it remains an open question whether structural transformation can be speeded up with a continuation of the movement of labor from agriculture to services with a small role being played by the manufacturing sector.

Appendix

Appendix Table 1. Sub-Saharan Africa: Country Groups Used in This Paper

Resource Rich	Upper Middle-Income	Lower Middle-Income	Low-Income		
Angola	Botswana*	Cameroon*	Benin*	Guinea-Bissau	Rwanda*
Chad	Cape Verde*	Côte d'Ivoire*	Burkina Faso*	Kenya*	Sierra Leone*
Congo, Dem. Rep.*	Gabon*	Ghana*	Burundi*	Liberia*	Somalia
Congo, Rep.	Mauritius*	Lesotho	Central African Rep.	Madagascar	Tanzania*
Guinea	Namibia*	Mauritania	Comoros*	Malawi*	Togo*
Nigeria*	Seychelles	São Tomé and Príncipe*	Eritrea	Mali	Uganda*
Sudan	South Africa*	Senegal*	Ethiopia*	Mozambique*	Zimbabwe*
Zambia*	Equatorial Guinea	Swaziland	Gambia, The	Niger*	

Note: Sudan includes South Sudan due to data availability. * signifies employment estimates based on actual household surveys.

*Countries marked with * are "Resource rich" with a LFPR 88%*

Appendix Table 2. Asia: Country Groups Used in this Paper

South Asia		East Asia	
Low-Middle-Income	Low-Income	Low-Middle-Income	Low-Income
Bhutan	Bangladesh	Indonesia	Cambodia
India	Nepal	Lao P.D.R.	Myanmar
Sri Lanka		Mongolia	
Pakistan		Philippines	
		Vietnam	

Appendix Table 3. List of Country Abbreviations

AGO	Angola	COM	Comoros	LSO	Lesotho	SSD	South Sudan
BGD	Bangladesh	CPV	Cabo Verde	MDG	Madagascar	STP	São Tomé and Príncipe
BDI	Burundi	ERI	Eritrea	MLI	Mali	SWZ	Swaziland
BEN	Benin	ETH	Ethiopia	MOZ	Mozambique	SYC	Seychelles
BFA	Burkina Faso	GAB	Gabon	MUS	Mauritius	TCD	Chad
BWA	Botswana	GHA	Ghana	MWI	Malawi	TGO	Togo
KHM	Cambodia	GIN	Guinea	NAM	Namibia	TZA	Tanzania
CAF	Central African Republic	GMB	Gambia, The	NER	Niger	UGA	Uganda
CIV	Côte d'Ivoire	GNB	Guinea-Bissau	NIG	Nigeria	VNM	Vietnam
CMR	Cameroon	GNQ	Equatorial Guinea	RWA	Rwanda	ZAF	South Africa
COD	Congo, Dem. Rep. of	KEN	Kenya	SEN	Senegal	ZMB	Zambia
COG	Congo, Rep. of	LBR	Liberia	SLE	Sierra Leone	ZWE	Zimbabwe

**Appendix Table 4. Sub-Saharan Africa and Asian Countries:
GDP per Capita (Current U.S. dollars)**

Country	2012
Burundi	286
Malawi	360
Niger	431
Liberia	439
Madagascar	445
Central African Republic	480
Gambia, The	499
Ethiopia	504
Eritrea	505
Togo	590
Mozambique	590
Guinea-Bissau	600
Sierra Leone	634
Uganda	678
Burkina Faso	679
Nepal	686
Rwanda	688
São Tomé and Príncipe	688
Mali	703
Benin	808
Comoros	815
Tanzania	870
Bangladesh	916
Cambodia	946
Zimbabwe	961
Senegal	1,037
Cameroon	1,234
Côte d'Ivoire	1,235
Kenya	1,239
Lesotho	1,267
Pakistan	1,280
Lao P.D.R.	1,414
India	1,471
Ghana	1,683
Vietnam	1,753
Sub-Saharan African countries (median)	678
South Asia (median)	1,098
East Asia (median)	1,414

Source: IMF, *World Economic Outlook* January 2016.

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Structural Transformation in Employment and Productivity:
What Can Africa Hope for?

