

# Agricultural Labor Is Not So Unproductive in Africa

Ellen B. McCullough

## Overview

Common wisdom: *In poor economies, agriculture is typically the sector that employs the most people and uses labor least productively.*

Findings:

- *Microeconomic analogs of productivity gaps between agriculture and nonagriculture (measured as the ratio between annual output per agricultural worker and annual output per nonagricultural worker) in four East African countries suggest that non-agriculture is only 3.4 times as productive as agriculture, rather than six times, as national accounts data for these countries would suggest.*
- *However, nonagriculture is only 1.4 times as productive as agriculture when productivity is measured as output per hour worked rather than annual output per worker.*
- *Workers in agriculture tend to supply fewer hours of labor per year: 700 hours per agricultural worker, compared with 1,850 hours per nonagricultural worker. Therefore, the cross-sector productivity gaps observed in output per worker per year reflect gaps in employment levels rather than gaps in returns per hour worked.*
- *The nonfarm activities in which rural households are engaged (whether in industry or services) have very close links to agriculture. Because of this, agriculture continues to play a key role in Sub-Saharan African economies.*

Policy messages: *These results suggest that the forces pulling labor into the industry and service sectors may be weaker than is commonly believed. The results also cast doubt on the notion that agriculture is intrinsically less productive than other sectors. Because time inputs in agriculture are generally low, possibly due to biophysical constraints, participation outside agriculture is associated with higher annual output per worker, because it presents the opportunity to supply more hours of labor per year.*

*Better understanding of the reasons for low agricultural labor demand would help in identifying opportunities to increase employment in agriculture and annual output per agricultural worker.*

### **The Issue: Is Labor So Unproductive in African Agriculture?**

This study addresses structural change in Africa, which involves the reallocation of labor from low-productivity sectors to more productive sectors. This is a dynamic process powered by several key features—productivity levels within sectors, productivity gaps between them, and the movement of labor between sectors. The larger the productivity gap between agriculture and other sectors, the greater the opportunity to achieve productivity growth as labor shifts out of agriculture. According to the conventional view and national accounts data, in poor economies, agriculture typically is the sector that employs the most people and uses labor least productively. Over time, cross-sector productivity gaps tend to shrink, as labor shifts out of agriculture and returns to labor across sectors are equalized through factor markets.

#### ***What Is the Problem?***

The premise of higher returns to labor outside agriculture is central to structural change and is supported by trends in national accounts statistics across countries and over time. Are these productivity differentials as high as the national accounts data suggest? If labor productivity levels are so much higher outside agriculture, why does so much African labor remain in rural areas? And why does rural income diversification remain somewhat limited? Explanations for these situations would include the following:

- *Farmers may face barriers to participating in nonagriculture opportunities.* Although returns may be higher outside farming, workers may not be able to diversify out of farming. Opportunities pulling rural workers into nonfarm employment are limited by the growth and productivity of the nonfarm economy (Reardon, Berdegue, and Stamoulis 2006). Accessing these opportunities can be difficult for individuals with limited human capital, experience, or financial capital. Nonfarm work requires different skill sets from farm work, so farmers must find ways to retool if they are to switch away from farming (Rodrik 2014).
- *Labor productivity levels may not be higher outside agriculture.* Although national accounts data indicate that labor outside agriculture is six times more productive than labor inside the sector, there are concerns about how reliable these estimates are. Gollin, Lagakos, and Waugh (2014) find several biases that lead to an *overestimation* of these gaps. Even so, after correcting for these biases, they still conclude that labor productivity outside agriculture in Africa is 3.3 times more productive.
- *Workers may not benefit from higher returns outside agriculture.* If the differential returns to nonagricultural activities accrue to owners of capital

rather than labor, the cross-sector gaps that households face at the micro level would be smaller than those suggested by national accounts. In capital-intensive industries like mining, wage rates are likely to be much lower than average labor productivity, as per national accounts data (McMillan and Harttgen 2014).

The study focuses on the second and third of these explanations by using micro-level household data to measure and analyze sectoral productivity gaps in four countries.

## **The Analysis: Comparing Micro with Macro Data**

### ***Taking the Worker's Perspective***

Understanding micro-level, cross-sector productivity differences, and how they relate to labor allocation decisions, is crucial for comprehending the dynamic forces that power structural change and economic progress in the developing world. Such an understanding would have huge policy payoffs. The study departs from much of the previous literature on structural change by taking the perspective of workers.

The analysis draws on newly available household survey data—the Living Standards Measurement Study–Integrated Surveys on Agriculture (LSMS-ISA) data sets from the World Bank—to measure three key structural change parameters: sector participation, time use, and labor productivity. This micro perspective gets closer to the labor supply decisions made by households and the labor demanded by farm and firm owners.

### ***Calculating Meaningful Aggregates from the Micro Data***

The study analyzes LSMS-ISA data from four countries: Ethiopia (2013/14), Malawi (2010/11), Tanzania (2010/11), and Uganda (2010/11). It estimates the microeconomic analogs of key structural change metrics. Specifically, the analysis computes the following:

- *Labor supply.* At the individual and household levels, annualized labor supply aggregates are constructed for three sectors (agriculture, industry, and services) and three types of activities—household operated farm enterprises (farms), household operated nonfarm enterprises (NFEs), and wage labor market participation. All activities are assigned to their respective sectors of the economy (agriculture, industry, or services) using Industry Standard Industrial Classification codes.
- *Returns to labor.* Given the LSMS survey design, average returns to labor are estimated differently for each type of activity:
  - The returns to operating a farm enterprise are based on annual net farm revenue derived from the Rural Income Generating Activities aggregates.
  - For NFEs, an annualized net firm revenue variable is constructed using reported profits or household estimates of gross NFE revenue and costs.

- Returns to labor market participation are given by gross total wages received by wage workers, including in-kind payments (for example, meals received) and gratuities.
- *Labor productivity.* Two types of average labor productivity measures are constructed using the labor supply and return variables:
  - *Per worker*, based on output per worker per year.
  - *Per hour*, based on output per hour of labor supplied to each activity per year.
  - *Per firm*, for farms and NFEs, based on net revenue per firm labor inputs (including hired workers).

### **The Results: There Are Employment Gaps Rather Than Productivity Gaps**

The study pursues two major objectives. First, it seeks to establish whether the national accounts estimates of sectoral gaps in labor productivity are borne out by the micro data. Second, it explores the ways in which rural individuals participate in different sectors of the economy as self-employed and wage laborers.

#### ***Micro Data Tell a Different Story***

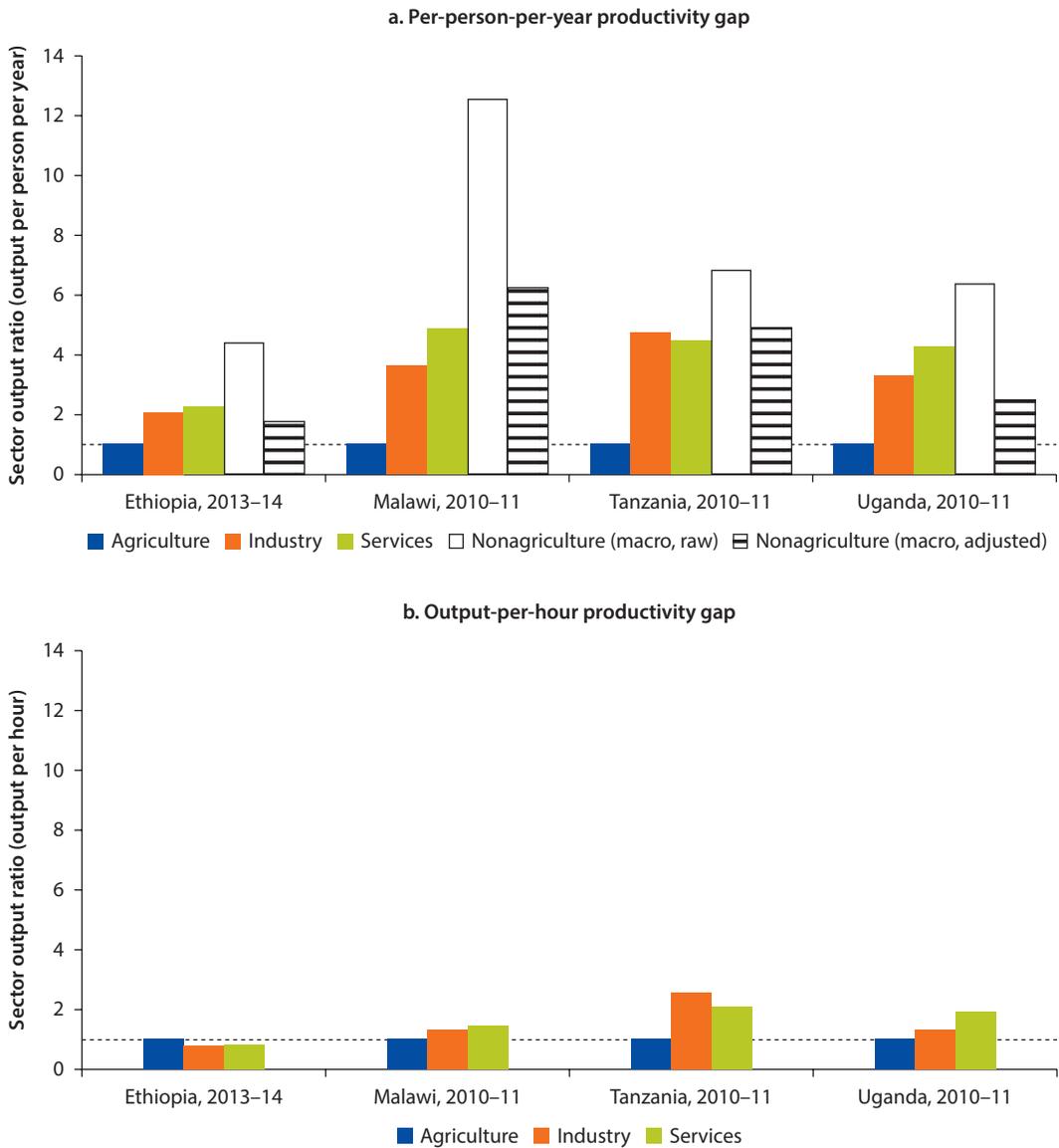
To obtain measures of labor productivity gaps, labor shares are first estimated by sector. Two empirical insights emerge from this analysis. First, *workers in different sectors supply different amounts of labor per year.* Generally, those working in nonagriculture sectors supply far more hours than those working in agriculture. The study finds that workers supply twice as many hours to nonagriculture in Ethiopia, Malawi, and Tanzania, and up to 1.6 times as many hours in Uganda. By calculating labor productivity based on sector participation rather than hours worked, agricultural labor productivity will be underestimated relative to nonagricultural labor productivity. Researchers should avoid the assumption that labor inputs are equal across sectors.

Second, *secondary work should not be ignored.* The data show that nonagricultural workers more commonly also participate in some agricultural work than vice versa (agricultural workers also participating in some work outside agriculture). If secondary activities are ignored, estimates of labor supplied to agriculture will be biased downward, and estimates of agricultural productivity will be overestimated.

#### ***Vanishing Productivity Gaps***

The study finds that productivity gaps measured using micro data are smaller than those derived from the national accounts (figure 6.1). Figure 6.1, panel a, shows the gap based on per-person-per-year productivity measures, comparing the LSMS-ISA estimates with the national accounts estimates. For the latter, two estimates are presented: the raw national accounts productivity gaps, and the adjusted gaps constructed by Gollin, Lagakos, and Waugh (2014). The gaps from the micro data are much smaller, especially in

**Figure 6.1 Micro Productivity Gaps All but Disappear When Taking Hours of Work into Account**



Source: Estimates based on LSMS-ISA data.

Ethiopia and Malawi, and less so in Uganda and Tanzania. The gaps all but disappear when they are based on hours worked in each sector rather than the number of workers (figure 6.1, panel b). Workers outside agriculture supply, on average, far more hours of labor per year than do agricultural workers. The study checked whether similar results applied if different measures of returns to labor were used (box 6.1).

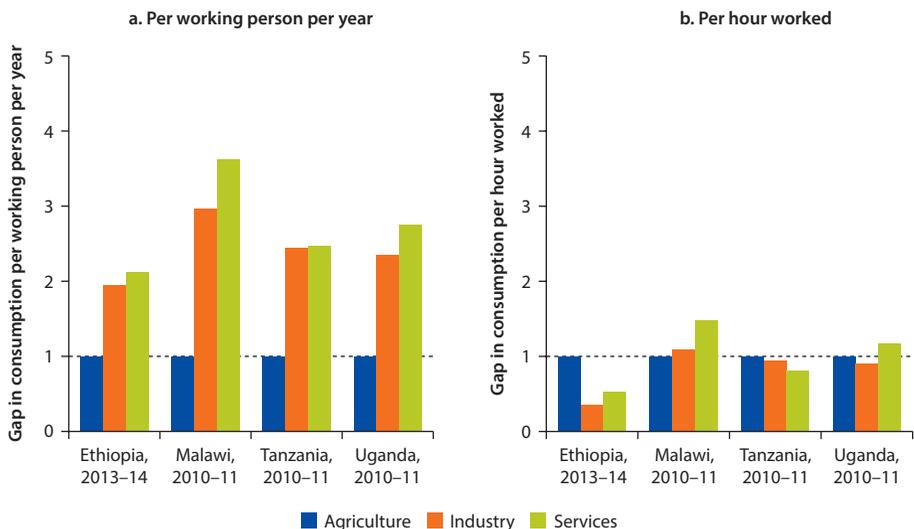
### Box 6.1 How Robust Is the Micro Evidence?

Estimates of labor productivity could be affected by mismeasurement of returns to labor (the numerator) or of the labor supply (the denominator). The study explores the robustness of productivity gap estimates to alternative measures of labor returns and labor supply.

*Alternative numerator.* Measurement of farm and firm net income is challenging, as is measurement of wage labor earnings. Do the results change if alternative measures of returns to sector participation are used to calculate labor productivity? The study takes *household consumption per worker* as an alternative measure of the net returns to participating in a sector. The Living Standards Measurement Study–Integrated Surveys on Agriculture surveys are designed to measure household consumption, so this variable plays to the strengths of the data. Figure B6.1.1, panel a, compares annual consumption per working household member in households participating primarily in agriculture with those engaged primarily in other sectors. Figure B6.1.1, panel b, shows a cross-sector comparison of consumption *per hour of labor supplied* by the household. These gaps are fairly similar across countries and are smaller than productivity gaps, although they follow similar rankings. As with productivity gaps, consumption gaps disappear almost entirely when they are expressed per hour of labor supplied by each household.

*Alternative denominator.* The study investigates the extent to which the results are sensitive to how the labor supply variable is calculated. First, the study assesses whether the timing of the interview affects the findings. Although seasonality appears to influence the productivity measure marginally (there were some months with especially high or low productivity measures), there does not seem to be a major pattern of overrepresentation or

**Figure B6.1.1 Gaps in Household Consumption per Worker per Year Disappear after Accounting for Cross-Sector Differences in Hours Worked**



Source: Estimates based on LSMS-ISA data.

box continues next page

**Box 6.1 How Robust Is the Micro Evidence?** *(continued)*

underrepresentation of these months. The study concludes that seasonal bias due to survey timing does not bias the key labor supply or productivity variables. Second, the study examines whether the recall period used to obtain labor supply information affected the results. The findings suggest that, given the survey design, labor supply for smallholders is likely to be overestimated rather than underestimated. If this is the case, then underemployment in agriculture would likely explain an even larger proportion of the productivity gaps.

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***Key finding:** Intersectoral differences in annual earnings per worker arise from differences in employment volume (hours per worker of labor supplied) rather than different productivity per hour of labor.*

**Nonfarm Activities Are Closely Linked to Agriculture**

The study takes a closer look at the specific nonfarm activities that engage rural households in the four countries.

**Activities in Industry**

- Manufacturing accounts for between 13 and 38 percent of NFEs (the smallest share being in Tanzania and the largest in Malawi). The focus is on elementary manufacturing, such as brewing alcoholic beverages, producing charcoal, milling grains, butchering, baking, weaving, and other activities that transform raw primary materials.
- Wage employment in manufacturing is similar to the NFE activities, with a focus on agro processing for food, timber, and textiles, as well as manufacturing bricks and other construction materials.

**Activities in Services**

- Commerce is the dominant service sector focus of NFEs, constituting between 26 and 66 percent of rural and urban firms. NFEs are likely to engage in the wholesale and retail trading of fruits and vegetables, other food products, charcoal, and other household goods.
- In wage employment, activities are wide ranging, including teaching, health, social, and religious workers; public administrators; technicians; domestic service providers; as well as restaurant, hotel, and tourism employees.

***Key finding:** A large portion of NFEs and wage jobs involve buying and selling agricultural products, processing raw agricultural materials, or providing services in support of farm production. Activities in both sectors are oriented toward local demand. Growth in industry and services is therefore very closely linked with growth in agriculture.*

## The Implications

The study underscores agriculture's strategic role in Sub-Saharan Africa. Agriculture continues to be the predominant income-earning activity for most households, and most nonfarm agricultural work is closely linked to agriculture. These strong links highlight additional benefits from achieving agricultural productivity growth, since agricultural growth in Africa has been linked especially with increased demand for nontradable goods and services (Delgado et al. 1998; Christiaensen, Demery, and Kuhl 2011).

Productivity gaps are about half as large when measured from the household perspective rather than the national accounts perspective. And gaps are half as large again when measured in hours worked rather than annual output per worker. The micro evidence is consistent with the idea that there is some scope for achieving productivity gains by shifting labor from agriculture to industry or services. Understanding what limits the labor supply of workers in agriculture compared with other sectors is an important next step.

The time sensitivity (or, more generally, seasonality) of agricultural tasks could reduce demand for agricultural labor during parts of the year. Indeed, the time sensitivity of agricultural tasks could explain the coexistence of seasonal labor bottlenecks and widespread underemployment in the agriculture sector. In the presence of time-sensitive labor tasks, water control and agricultural land management practices might have a role to play in smoothing agricultural labor demand throughout the year.

Finding ways to increase annual returns to agricultural workers is an important challenge, especially as the rural labor force continues to expand due to population growth. Increases in these returns could arise through increased employment levels of agricultural workers, or increased productivity per hour worked.

Helping workers retool for employment outside agriculture might allow rural workers to employ themselves more fully. Nonagricultural wage employees appear to have higher levels of education than agricultural wage employees and self-employed workers, suggesting that human capital plays a role in securing employment outside agriculture.

## Additional Reading

### *This chapter draws on:*

McCullough, Ellen. 2017. "Labour Productivity and Employment Gaps in Sub-Saharan Africa." *Food Policy* 67: 133–52. <https://doi.org/10.1016/j.foodpol.2016.09.013>.

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