EVANS SCHOOL OF PUBLIC POLICY & GOVERNANCE
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Evans School Policy Analysis and Research (EPAR)

Poverty in Ethiopia
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Main findings

- We look at several indicators of GDP, agricultural employment, and poverty in Ethiopia from 1994 up to the most recent available data
- Beginning around 2004, the reduction in poverty has been slower than the rise in GDP.
- Ethiopia's GDP (PPP in constant 2011 international $) averaged 4 percent annual growth between 1994 and 2003, rising to 10 percent average annual growth from 2004-2016.
- Using the PPP$1.90 per capita per day international poverty line, the proportion of the population in poverty fell sharply (66 to 36 percent) up to 2004, and flattened out thereafter.
- The poverty gap ratio, capturing the shortfall between each individual's income and the poverty line, also fell sharply (26 to 8 percent) up to 2004, but rose slightly to 9 percent by 2012.
- Poverty estimates using the national poverty line rather than $1.90/day fall slightly more in the period after 2004, though still at lower rates than before 2004 and counter to the sharp rise in GDP.
- The share of total employment in agriculture, generally stable from 1994 to 2006, increased from 47 percent in 2006 to a peak of 73 percent in 2013 according to World Bank estimates. Data from Ethiopia's Central Statistical Agency, however, estimate the share of employment in agriculture falling over three data points, from 80 percent in both 1999 and 2005 though also ending at 73 percent in 2013. Since 2013 the World Bank estimates employment dropping by approximately one percent each year.
- Value-added in agriculture (% of GDP) has not kept pace with overall GDP growth, though employment in agriculture has remained steady at around 70% of total employment since 2011.

Introduction and Data

In this brief, we report on measures of economic growth, poverty and agricultural activity in Ethiopia. For each category of measure, we first describe different measurement approaches and present available time series data on selected indicators. We then use data from the sources listed below to discuss associations within and between these categories between 1994 and 2017.

We draw primarily on data from the World Bank[1], using a series of available Ethiopia indicators commonly cited in the literature as measures of economic growth (namely GDP and GDP per capita), measures of agricultural activity (including agricultural land, employment in agriculture, and agricultural value added), and measures of

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[1] World Bank Open Data, Ethiopia page: https://data.worldbank.org/country/ethiopia

poverty (including the poverty headcount ratio at $1.90 a day and at national poverty lines, the poverty gap ratio at $1.90 a day and at national poverty lines, and the squared poverty gap ratio).

We supplement World Bank data with data from the following sources:
- **Ethiopia Socioeconomic Survey (ESS)**: The ESS is a nationally-representative household panel survey. We use data from the ESS in 2011, 2013, and 2015 to calculate mean consumption expenditure per capita estimates in Ethiopia.
- **Dercon, Hoddinott, and Woldehanna (2008):** In their paper, *Growth, poverty and chronic poverty in rural Ethiopia: Evidence from 15 communities 1994-2004,* the authors include estimates for the squared poverty gap ratio from the Ethiopian Rural Household Survey (ERHS), a longitudinal household dataset.[2]
- **Stifel and Woldehanna (2015)**: In their working paper, *Estimating utility-consistent poverty in Ethiopia, 2000-2011,* Stifel and Woldehanna include estimates for the poverty headcount ratio, poverty gap ratio, and squared poverty gap ratio using data from the Ethiopia Household Income, Consumption and Expenditure Surveys (HICES) in 2000, 2005, and 2011. The authors report estimates originally reported by the Central Statistical Agency of Ethiopia as well as their own estimates using utility-consistent poverty lines.[3]
- **National Labor Force Survey (NLFS)**: The Central Statistical Agency of Ethiopia (CSA) implemented the NLFS in 1999, 2005, and 2013. We use their estimates of employment in agriculture (% of population).
- **United Nations Development Programme (UNDP):** The UNDP reports on poverty related measures for Ethiopia in 2011. It includes the Multidimensional Poverty Index (MPI), a measure of poverty that incorporates measurements of health, education, and living standards, and the percent of the population living below the PPP $1.90/day poverty line and below the national poverty line.

Measures of GDP, GDP per capita, and household annual consumption are converted to constant 2011 international US$ for comparison and adjusted for Purchasing Power Parity (PPP), a calculation that supports comparability between countries by using the local cost of a common basket of goods and services (OECD, 2015). Given that exchange rates only reflect *internationally traded* goods, PPP measures are considered preferable for measuring poverty because many poor households have rural subsistence livelihoods comprised of goods that are not traded internationally (Deaton, 2010).[4]

Measuring Economic Growth

Gross Domestic Product

Gross Domestic Product (GDP) measures the flow of income from goods and services among individuals, firms, and the government within a nation's borders, regardless of the nationality of the individual or firm. In addition to GDP, many studies use GDP per capita to consider the association between growth and poverty

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[2] The ERHS is not regarded as nationally representative.

[3] Utility-consistent estimates are calculated using Arndt and Simler's methodology (2010). The utility-consistent poverty lines are derived by applying PLEASe code to the HICES data.

[4] Despite this, PPP may overestimate the incomes of the poor due to quality bias and substitution bias (Almås, 2012). Quality bias results from using a homogenous basket of goods for comparability, which does not account for quality differences in the products available and consumed across countries. "Substitution bias arises from applying cross-country reference prices to a consumption basket containing constant base year quantities, which does not account for consumers in different contexts switching their consumption quantities or patterns from relatively expensive goods toward relatively less expensive goods (i.e., different baskets) as prices change" (EPAR, 2016).

reduction (e.g., Balakrishnan, Steinberg, & Syed, 2013; Wieser, 2011; Bourguignon, 2003; Roemer & Gugerty, 1997).
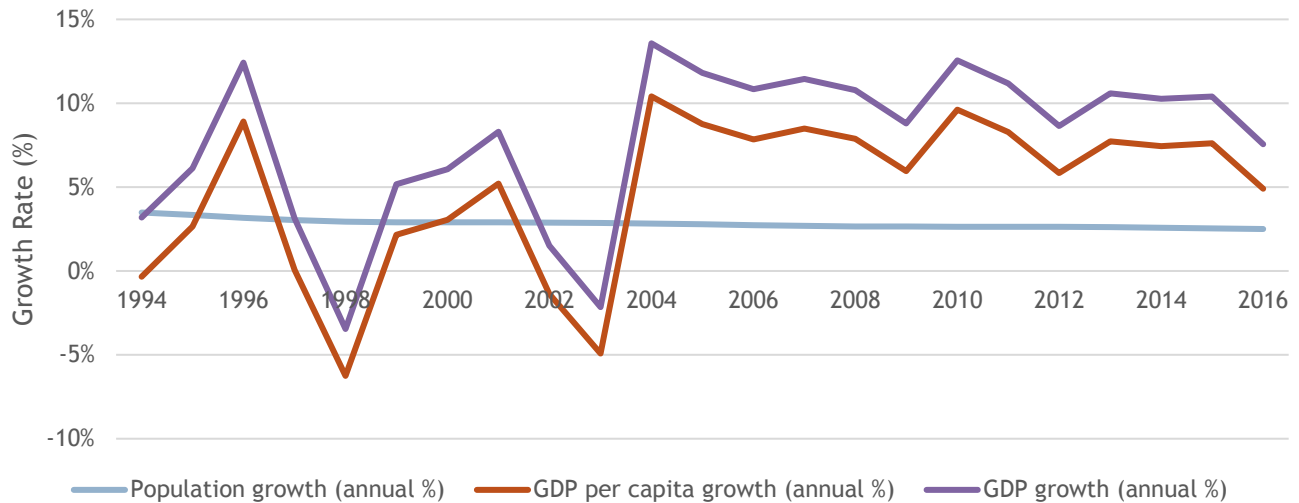
Figure 1. Measures of Economic and Population Growth in Ethiopia 1994-2016
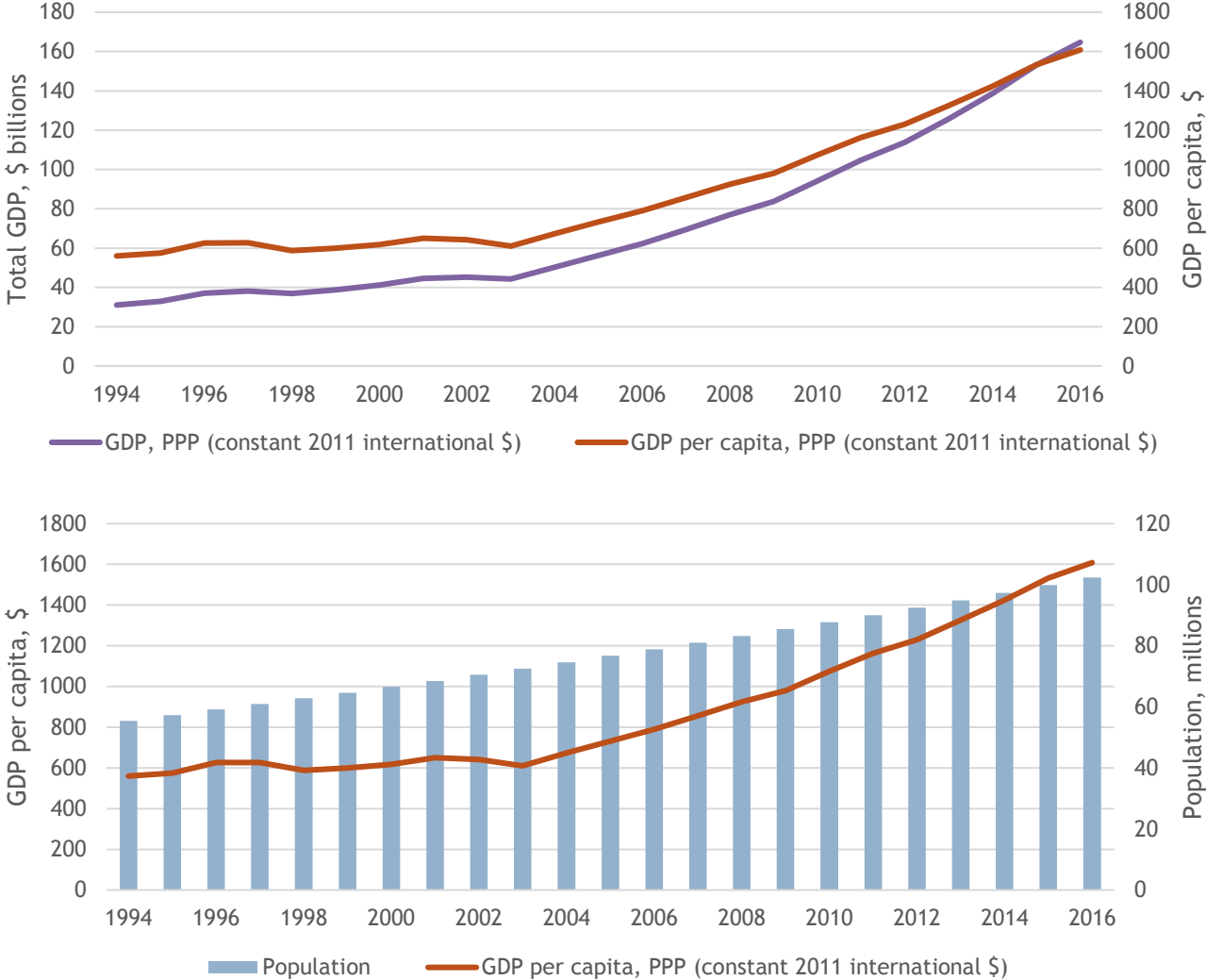
Source: World Bank

As shown in *Figure 1,* both GDP, population, and hence GDP per capita in Ethiopia have been increasing since 2003, though as evident in *Figure 2*, the growth *rates* have fluctuated.

Figure 2. Population Growth and GDP Growth in Ethiopia 1994-2016

Source: World Bank

The major GDP and GDP per capita growth rates dips are likely associated with the Eritrean-Ethiopian War that broke out officially in May 1998, a harsh drought that peaked in 2003, rising food prices in 2007-2008, and the global recession of 2008.

Household Annual Consumption

Economic growth can also be measured using consumption data from household surveys, found to have a stronger statistical association with poverty reduction than growth measured by changes in GDP per capita (Adams, 2004).

We estimate household consumption expenditure per capita using data from the Ethiopia Socioeconomic Survey (ESS), a nationally-representative household panel survey, for 2011, 2013, and 2015. Estimates of mean household annual consumption expenditure per adult-equivalent household member decline over time from $1084.80 in 2011, to $728.06 in 2013, and $608.78 in 2015 (all estimates in constant 2011 international dollars, adjusted for PPP). This decline may be partly related to high rates of inflation (~33% between 2011 and 2013, and ~57% between 2011 and 2015).[5]

Measuring Poverty

Among the various indicators used to describe different aspects of poverty, we report available estimates of the poverty headcount ratio, poverty gap ratio, and squared poverty gap ratio. The Multidimensional Poverty Index (MPI) incorporates measurements of health, education, and living standards (Morrell, 2011). The United Nations Development Programme has only collected one year of MPI data for Ethiopia (2011). It estimates 88.2 percent of the population lives in multidimensional poverty (67 percent in severe multidimensional poverty), compared to 33.5 percent of the population below the PPP $1.90/day poverty line and 29.6 percent below the national poverty line.

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[5] Inflation calculated using the Consumer Price Index, as reported by the World Bank (base year is 2010): https://data.worldbank.org/indicator/FP.CPI.TOTL?locations=ET

Poverty Headcount Ratio

Poverty headcounts or headcount ratios consider the number of people or proportion of the population that fall below a poverty line, often the international poverty line which is currently set at $1.90 per day at PPP rates (World Bank, 2015). Studies commonly use the poverty headcount ratio when comparing economic growth and poverty (e.g., Wieser, 2011; Loayza & Raddatz, 2010; Adams, 2004; Roemer & Gugerty, 1997).

Poverty headcount ratios may have different reported values depending on the agency collecting, analyzing, and disseminating the data. For example, in *Figure 3*, we present four measurements, two reported by the World Bank (poverty headcount ratios at both $1.90 a day and at the national poverty line) and two from Stifel & Woldehanna (2015): a poverty headcount ratio estimate using original CSA data and a utility-consistent (UC) estimate. Both the CSA and UC estimates are calculated using HICES survey data and region-specific poverty lines for twenty spatial domains in Ethiopia, but the UC measure constructs an alternative "utility-consistent" poverty estimate based on an adjusted poverty line.[6]

Figure 3. Comparison of Different Poverty Headcount Sources 1995-2011
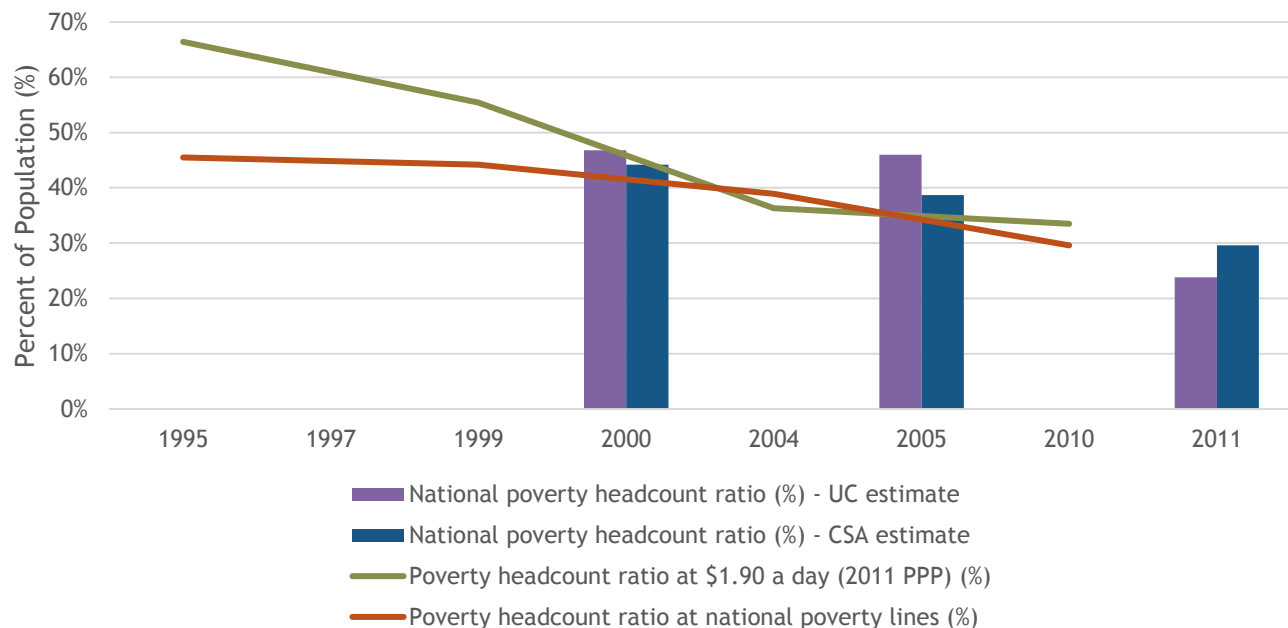
Source: Both the poverty headcount ratio at $1.90 a day and poverty headcount ratio at national poverty lines are collected by the World Bank. Both the UC and CSA estimates for the national poverty headcount ratio are drawn from Stifel and Woldehanna (2015). The CSA estimate uses the original poverty line reported by Ethiopia's CSA, and the UC estimate is based on a utility-consistent poverty line estimated with PLEASe code.

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[6] The UC estimate is derived by running HICES data through PLEASe code. The PLEASe code "estimates initial poverty lines by valuing the minimum cost of consuming domain-specific calorie requirements based on the consumption patterns of the poorest X percent households in each domain, where X is defined by the user. This process is repeated over five iterations using the poverty lines from the previous iteration as the thresholds for determining the consumption patterns of the poor households" (Stifel & Woldehanna, 2015, p. 59).

While the estimates differ, all four measures follow a similar downward trend, suggesting a decrease in the breadth of poverty in Ethiopia between 1994 and 2011.

Poverty Gap and Squared Poverty Gap Ratios

The poverty gap ratio and squared poverty gap ratio measure the depth of poverty; how far individuals are below the poverty line.[7] *Figure 4* presents estimates of the poverty gap ratio in Ethiopia reported by different sources.

*Figure 4.* Comparison of Different Poverty Gap Ratio Sources 1994-2011
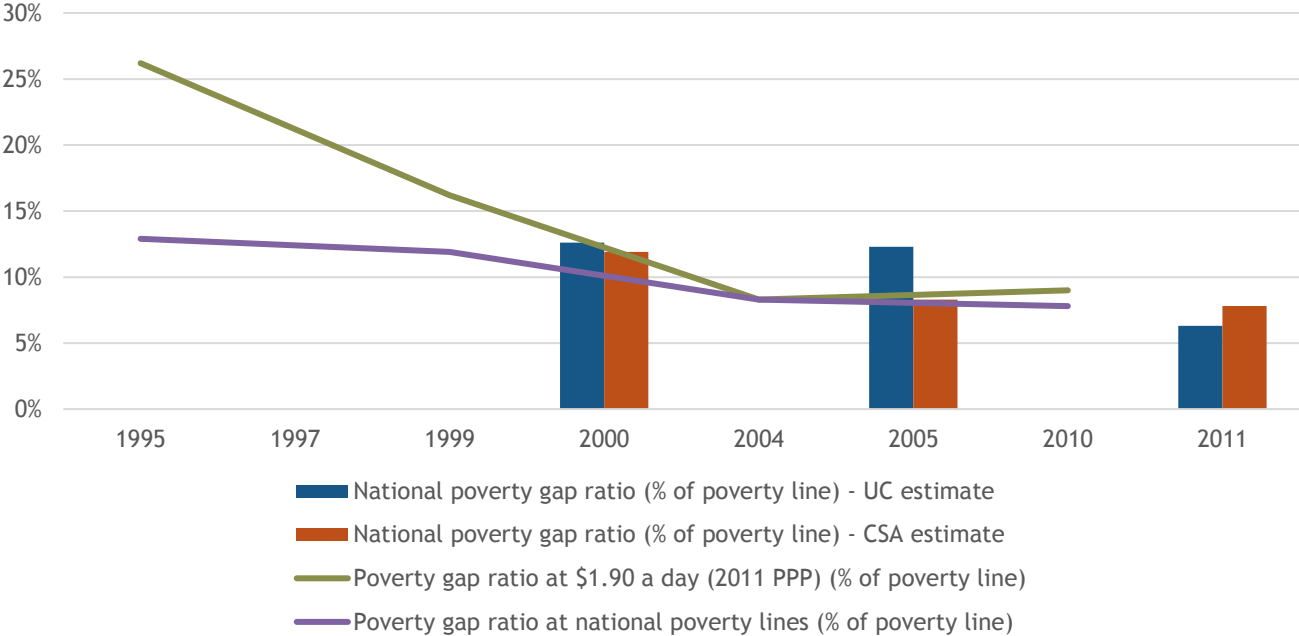
Source: Both the poverty gap ratio at $1.90 a day and poverty gap ratio at national poverty lines are collected by the World Bank. Both the UC and CSA estimates for the national poverty headcount ratio are drawn from Stifel and Woldehanna (2015). The CSA estimate uses the original poverty line reported by Ethiopia's CSA, and the UC estimate is based on a utility-consistent poverty line estimated with PLEASe code.

While the UC estimate of the national poverty gap ratio shows a large decrease from 2005 to 2011, the other three measures show the poverty gap ratio either rising slightly or relatively flat after 2004.[8] As with the poverty headcount ratio, the World Bank estimates show that the large difference from using the international $1.90 a day poverty line versus the national poverty line mostly disappears after 2004.

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[7] The poverty gap ratio measures the depth of poverty and is calculated by finding the shortfall between each individual's income and the poverty line, and dividing this total by the poverty line (Schaffner, 2014). When squared, individuals furthest from poverty line, ow with the biggest gap, are given more weight than those with smaller gaps.
[8] Stifel and Woldehanna (2015) attribute the difference in the UC and CSA estimates to the handling of the poverty lines and deflation—the UC approach estimates poverty lines for each region for each year, while the CSA approach uses the 1995 poverty line as a benchmark.

Figure 5. Comparison of Different Squared Poverty Gap Ratio Sources 1994-2011
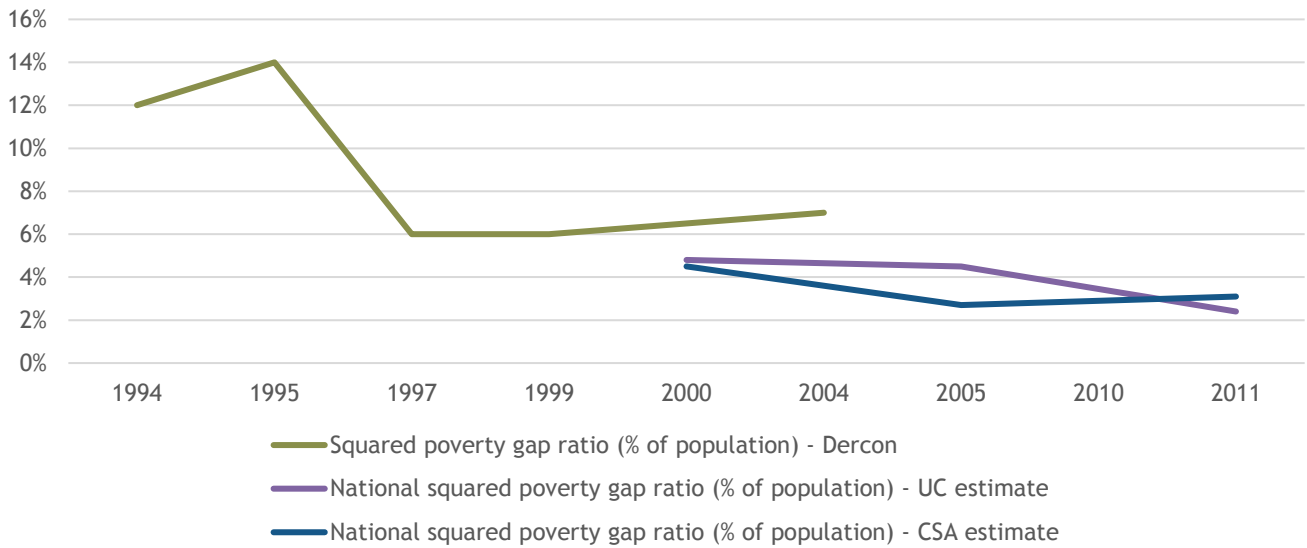

Source: The squared poverty gap ratio is from Dercon (2011) estimates, using ERHS data. Both the UC and CSA estimates for the national poverty headcount ratio are drawn from Stifel and Woldehanna (2015). The CSA estimate uses the original poverty line reported by Ethiopia's CSA, and the UC estimate is based on a utility-consistent poverty line estimated with PLEASe code.

In addition to capturing the depth of poverty, the squared poverty gap ratio weights larger shortfalls from the poverty line more than smaller shortfalls (Morduch, 2005). As no single source reports squared poverty gap ratio estimates for the entire time range of dates, we use estimates from Dercon (2011) for 1994 to 2004, based on ERHS data (not nationally-representative), and estimates from Stifel and Woldehanna (2015), based on CSA data, both unadjusted and adjusted as a utility-consistent poverty line, for 2000 to 2011 (*Figure 5*).

Indicator Comparison

In *Figure 6*, we review three different poverty measures from 1994-2011: poverty headcount ratio, poverty gap ratio, and squared poverty gap ratio. We draw on two different sources for the squared poverty gap ratio (Dercon, 2011 for 1994-2004 and Stifel and Woldehanna, 2015 for 2000-2011) in order to match the range of time for which we have headcount ratio and poverty gap ratio data.

Figure 6. Comparison of Two Poverty Indicators from 1994-2011

■ Poverty headcount ratio at $1.90 a day (2011 PPP) (% of population)
■ Poverty gap ratio at $1.90 a day (2011 PPP) (% of poverty line)
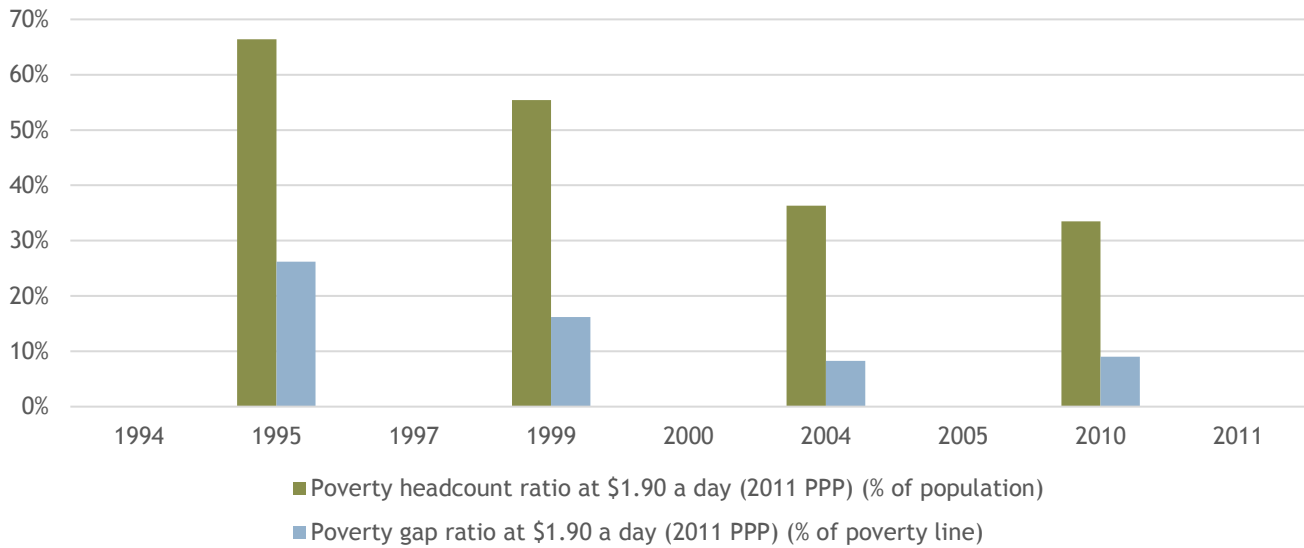
Source: Poverty headcount ratio and poverty gap ratio are sourced from the World Bank.

Based on these indicators, it appears that both the breadth and depth of poverty decreased substantially between 1994 and 2004, with the poverty headcount ratio decreasing from 66 to 36 percent and the poverty gap ratio decreasing from 26 to 8 percent, with the number (breadth) slightly decreasing and gap (depth) slightly increasing in 2010. Since the squared poverty gap sources differ, they cannot reliably be considered a time trend.

Agricultural Indicators

Growth in sectoral value added to GDP is used by some studies to compare the impacts of growth in different sectors on poverty reduction (e.g., de Janvry & Sadoulet, 2010; Dollar & Kraay, 2002). Loayza & Raddatz (2010), using data from 55 developing countries from the 1980s-1990s, find that growth driven by labor-intensive sectors (e.g., agriculture, construction, and manufacturing) may be associated with greater reductions in poverty. "De Janvry & Sadoulet (2010) find that the impact of GDP growth originating in agriculture on expenditure growth among the poorest 40% of the population is approximately three times larger than the effect of growth originating in the rest of the economy" (EPAR, 2016).

Figure 7. Agricultural Estimates for Ethiopia 1994-2017
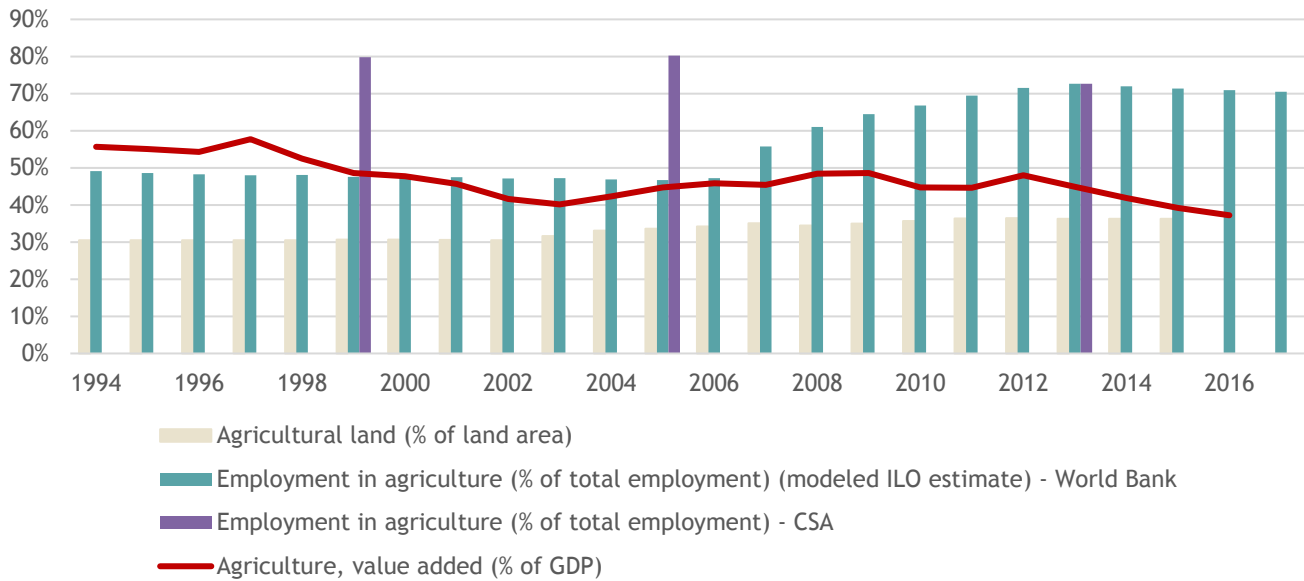
Source: Agricultural land, employment in agriculture (modeled ILO estimate), and agriculture, value added are sourced from the World Bank. The second estimate for employment in agriculture (purple bars) is sourced from CSA calculations based on the National Labor Force Survey (NLFS).

Agriculture accounted for 37 percent of Ethiopia's GDP as of 2016, down from a high of nearly 58 percent in 1997 (*Figure 7*). The amount of land dedicated to agriculture has remained relatively constant since 1994, but trends around employment in the sector differ by data source. According to World Bank data based on International Labour Organization (ILO) estimates, that employment in agriculture in Ethiopia began steadily increasing in 2007 and has leveled off at around 70 percent of total employment since 2011. The Ethiopian CSA, using NLFS data, reports that employment in agriculture has fallen from around 80 percent in 1999 and 2005 to 73 percent in 2013.[9] The sources therefore generally agree on the current share of agriculture in total employment, but differ in whether this represents an increase or a decrease from previous levels.

Despite employment in agriculture remaining high by both estimates, the share of agricultural value added to GDP has declined nearly 20 percent since 1994 (from 56 percent in 1994 to 37 percent in 2016) Most recently, Ethiopia suffered an El Niño-induced drought in 2015-16, contributing to the downward trend of agricultural value added to GDP (FAO, 2017). The Food and Agriculture Organization (FAO) reports that 50-90 percent of crop production was lost (*Ibid.*).

Comparing Economic Growth, Poverty, and Agricultural Indicators

Figure 8 plots selected indicators of economic growth, poverty and agricultural indicators together. Overall, GDP has grown in Ethiopia since 1994 and poverty has decreased, but at different rates. The increase in agricultural value added (in constant 2011 international $) begins to flatten in 2012 while overall GDP

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[9] The difference between the World Bank and CSA estimates may be because the International Labour Organization (ILO) classifies economic activity using a classification based on where work is performed (industry) rather than type of work performed (occupation). Under this classification, all of an enterprise's employees are classified under the same industry, regardless of their trade or occupation (World Bank, Statistical Concept and Methodology).

continues to grow at a stronger rate, suggesting that current growth in Ethiopia is driven more by non-agricultural sectors.

Figure 8. Comparing Economic Growth, Poverty, and Agricultural Value-Added in Ethiopia 1994-2016
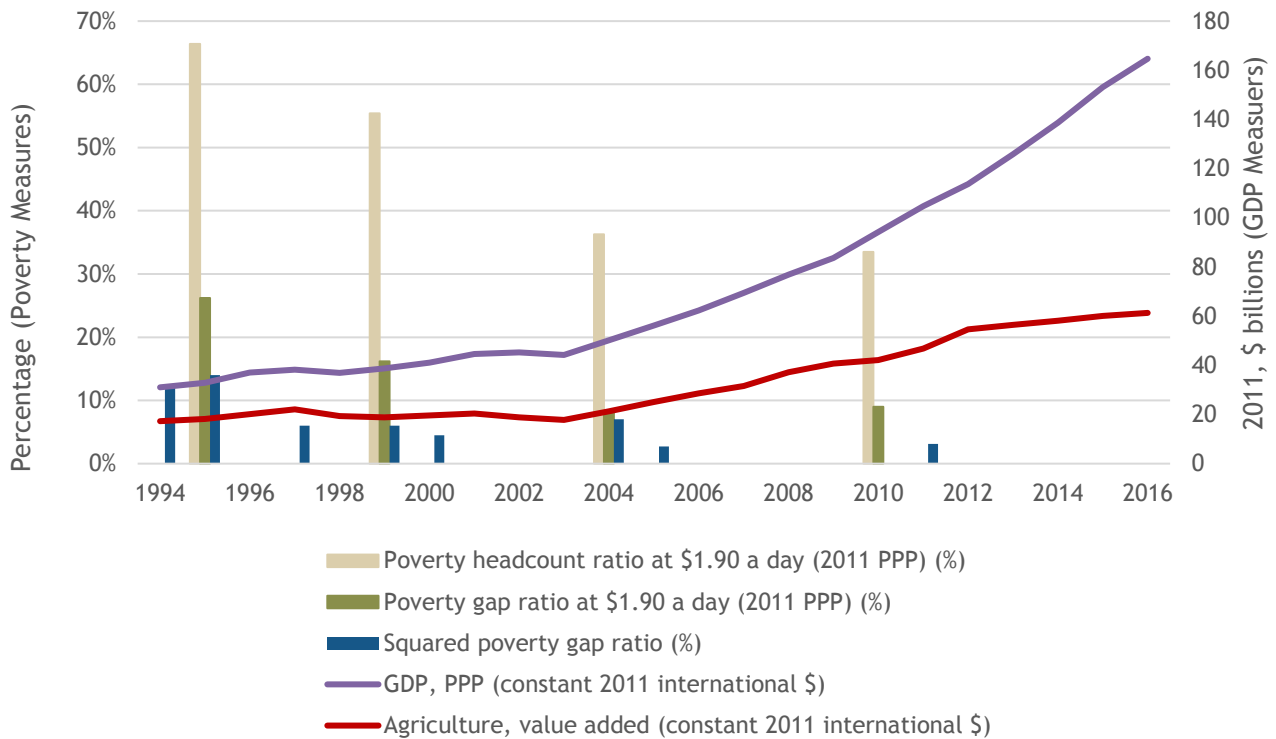
Source: The poverty headcount ratio at $1.90 a day, poverty gap ratio at $1.90 a day, GDP, and agriculture value added are collected by the World Bank. The squared poverty gap ratio estimates come from two sources and therefore do not offer a reliable time series: estimates for the years 1994, 1995, 1996, 1999, and 2004 are from Dercon (2011) using the ERHS and estimates for the years 2000, 2005, and 2011 are from Stifel and Woldehanna (2015) using CSA data.

Conversely, the various measures of poverty in Ethiopia decreased considerably between 1994 and 2004, when GDP was comparatively stable. Since 2004, those poverty measures have remained relatively stable even as GDP has begun to grow more rapidly.

References

Adams, R. H. (2004). Economic growth, inequality and poverty: estimating the growth elasticity of poverty. *World Development*, 32(12), 1989-2014.

Almås, I. (2012). International income inequality: Measuring PPP bias by estimating Engel Curves for food. *American Economic Review*, 102(1), 1093-1117.

Arndt, C. & Simler, K. (2010). Estimating utility-consistent poverty lines with applications to Egypt and Mozambique. *Economic Development and Cultural Change*, 58(3), 449–74.

Balakrishnan, R., Steinberg, C. & Syed, M. (2013). *The elusive quest for inclusive growth: Growth, poverty, and inequality in Asia.* (IMF Working Paper). Washington, DC: International Monetary Fund. Retrieved from https://www.imf.org/external/pubs/ft/wp/2013/wp13152.pdf

Bourguignon, F. (2003). The growth elasticity of poverty reduction: Explaining heterogeneity across countries and time periods. In T. Eichner & S.J. Turnovsky (Eds.), *Inequality and growth: Theory and policy implications* (CESifo seminar series). Cambridge, Mass.: MIT Press

De Janvry, A., & Sadoulet, E. (2010). Agricultural growth and poverty reduction: Additional evidence. *The World Bank Research Observer*, 25(1), 1-20. doi: 10.1093/wbro/lkp015

Deaton, A. (2010). Price indexes, inequality, and the measurement of world poverty. *The American Economic Review,* 100(1), i-34. doi: 10.1257/aer.100.1.5

Dercon, S., Hoddinott, J., & Woldehanna, T. (2008). Growth, poverty and chronic poverty in rural Ethiopia: Evidence from 15 Communities 1994-2004. Chronic Poverty Research Center. Retrieved from https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1259333

Dickinson, E. (2011). GDP: a brief history. *Foreign Policy.* Retrieved from: http://foreignpolicy.com/2011/01/03/gdp-a-brief-history/

Dollar, D., & Kraay, A. (2002). Growth is good for the poor. *Journal of Economic Growth*, 7(3), 195-225. doi: 10.1023/A:1020139631000

EPAR (2016). Economic Growth & Poverty in Nigeria. *EPAR Technical Report #327.* Evans School of Public Policy & Governance, University of Washington. https://evans.uw.edu/policy-impact/epar/research/nigeria-economic-growth-poverty

FAO (2017). *Ethiopia - Drought response plan and priorities in 2017.* Food and Agriculture Organization. Retrieved from: http://www.fao.org/emergencies/resources/documents/resources-detail/en/c/853939/

Loayza, N. V., & Raddatz, C. (2010). The composition of growth matters for poverty alleviation. *Journal of Development Economics*, 93, 137-151.

Morduch, J. (2005). Poverty measures. In United Nations Statistics Division (Ed.), *Handbook on Poverty Statistics: Concepts Methods and Policy Use* (pp. 52-84). Retrieved from http://unstats.un.org/unsd/methods/poverty/pdf/un_book%20final%2030%20dec%202005.pdf

Morell, D. (2011, January-February). Who is poor? *Harvard Magazine*. Retrieved from http://harvardmagazine.com/2011/01/who-is-poor

OECD (2015). Purchasing power parities: Frequently asked questions (FAQs). Retrieved from http://www.oecd.org/std/prices-ppp/purchasingpowerparities-frequentlyaskedquestionsfaqs.htm

Roemer, M., & Gugerty, M. K. (1997). Does economic growth reduce poverty? *CAER II*, 499.

Schaffner, J. (2014). *Development economics: Theory, empirical research, and policy analysis.* Hoboken, NJ: John Wiley & Sons, Inc.

Stifel, D., & Woldehanna, T. (2015). *Estimating utility-consistent poverty in Ethiopia, 2000–11.* (UNU-WIDER Working Paper 142/2015) Retrieved from: https://dspace.lafayette.edu/bitstream/handle/10385/2182/Stifel-MeasuringPoveryandWellbeinginDevelopingCountries-2017-pp55.pdf?sequence=3

Wieser, C. (2011). *Determinants of the growth elasticity of poverty reduction: Why the impact on poverty reduction is large in some developing countries and small in others.* Paper presented at the 15th Annual Conference on Global Economic Analysis, Geneva, Switzerland. Retrieved from www.gtap.agecon.purdue.edu

World Bank (2015). *FAQs: Global poverty line update*. Washington DC: The World Bank. Retrieved from http://www.worldbank.org/en/topic/poverty/brief/global-poverty-line-faq