

# Revisiting Poverty Trends

## 2

This chapter examines trends in poverty in Africa using household consumption, generally the variable of choice for tracking poverty there.<sup>1</sup> In many African countries, such data are collected infrequently, are of poor quality, or are not comparable across surveys. How these data challenges are dealt with often underlies differing views about Africa's progress toward reducing poverty, including the Millennium Development Goal (MDG) target of halving poverty by 2015.<sup>2</sup>

The chapter is divided into five sections. The first section looks at whether correcting for the comparability and quality of data changes the view of how poverty has evolved in Africa. It focuses on region-wide trends, with specific countries featured only for illustrative purposes. The results are benchmarked against the World Bank's PovcalNet, the most comprehensive repository for poverty data for calculating regional and global trends. Scrutiny of data quality and comparability entails excluding some data, which leads to reliance on imputations to obtain long-term trends. The second section checks whether these imputations drive the alternative trends reported here, by reporting poverty trends using alternative methods and assumptions.

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The third section provides a brief profile of the poor, based on country typology, location within a country (urban/rural), and gender. The fourth section examines the dynamics of poverty—the movement of people into and out of poverty. The last section summarizes the chapter's main findings.

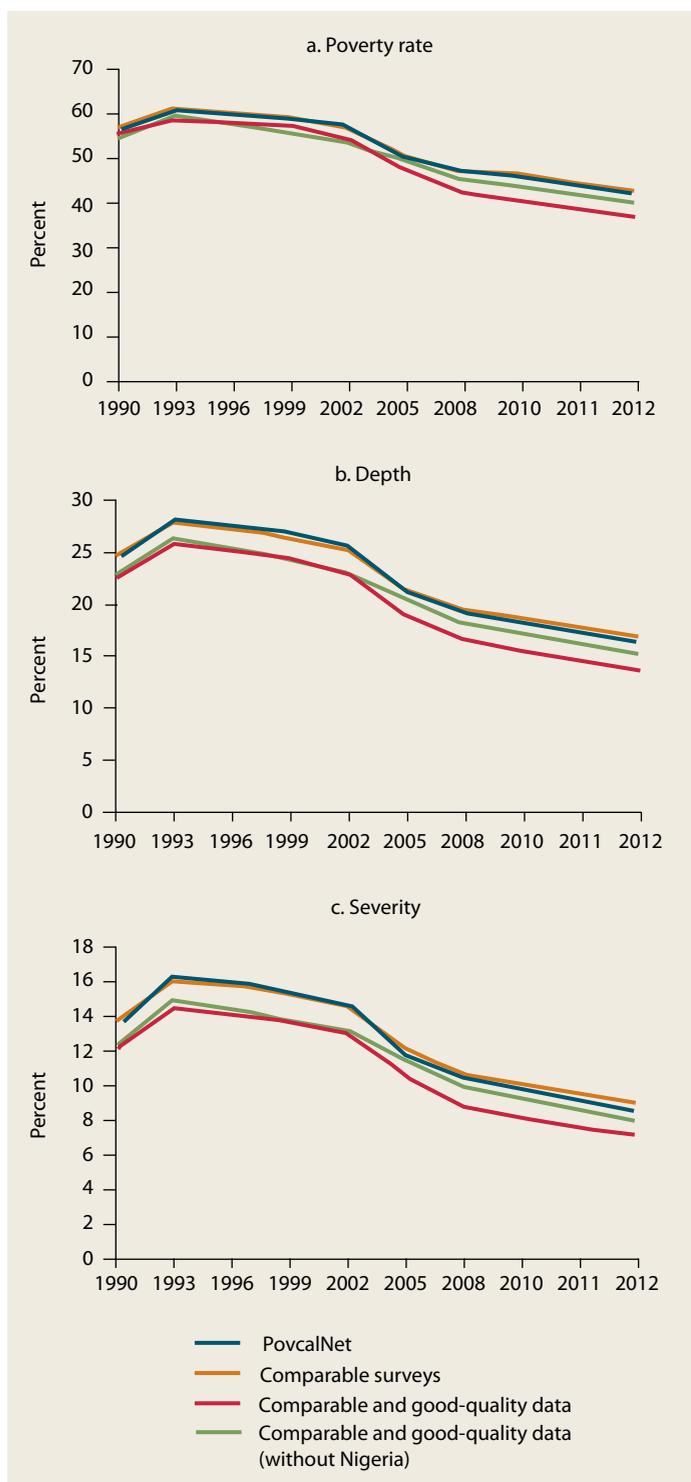
### Trends Using Comparable and Better-Quality Data

According to the latest estimates in PovcalNet, the share of Africa's population living below the international poverty line of \$1.90 declined from 57 percent in 1990 to 43 percent in 2012. This rate of poverty reduction was the slowest among the major regions of the world.

Consensus about the accuracy of these figures is lacking, because of debate over the quality of the data (Pinkovskiy and Sala-i-Martin 2014; Young 2012). What does the trend in poverty look like if known data comparability issues across surveys within countries and quality problems are addressed?<sup>3</sup>

Figure 2.1 shows four trends. The PovcalNet line shows changes in poverty based on all surveys in its database. These estimates are population-weighted poverty rates from 47 of Africa's 48 countries. Of the 47 countries for which poverty estimates

**FIGURE 2.1** Adjusting for comparability and quality changes the level, depth, and severity of poverty



Source: World Bank Africa Poverty database.

have been computed, one or more surveys are available for 43.<sup>4</sup> For each of these countries, a poverty rate is estimated from actual survey data (regardless of comparability or quality). For years without surveys, per capita growth in gross domestic product (GDP) is used to simulate consumption growth between survey years (see World Bank 2015b for a discussion of the method).

Additional estimates are based on only comparable surveys, comparable and good-quality surveys (as described in chapter 1, and henceforth referred to as corrected data), and comparable and good-quality surveys without Nigeria.<sup>5</sup> For the subset of comparable surveys identified in each country, the imputation methodology used in PovcalNet, which relies on growth in GDP per capita, was applied to fill gaps between surveys. By design, this method relies on fewer surveys and more imputed estimates of poverty.

Another set of estimates goes a step farther by taking quality as well as comparability into account. Starting from the subset of surveys deemed comparable, this estimate drops surveys of poor quality. This step affected five countries (Burkina Faso, Mozambique, Nigeria, Tanzania, and Zambia), which together represent 30 percent of Africa's population. Detailed descriptions of the quality of the surveys were used to determine which to exclude (Alfani and others 2012; World Bank 2012, 2013, 2014b, 2015c). For Nigeria, home to 18 percent of the population of Africa, this implied dropping the two comparable surveys (both of poor quality), and replacing them by one deemed of good quality (at the expense of greater reliance on imputation). The last set of estimates is based on a sample that corrects for comparability and quality and excludes Nigeria.

Correcting only for comparability shows slightly higher regional poverty rates between 1990 and 1999 but little change in trends compared with the PovcalNet estimates. Correcting for quality and comparability leads to a change in level after about 2002. Using these surveys only, the estimate of poverty in Africa is 6 percentage points lower

(37 percent instead of 43 percent) than the PovcalNet estimate in 2012. Nigeria accounts for a large fraction of this change. The fourth estimate, based on surveys that were both comparable and of good quality and excludes Nigeria, shows that poverty declined from about 55 percent to 40 percent (15 percentage points), compared to the 14 percentage-point decline (from 57 percent to 43 percent) revealed by the PovcalNet data.

The headcount poverty rate is a simple measure of the share of the population living below the poverty line; it does not distinguish among the poor. Depth of poverty captures the amount of shortfall in consumption among the poor as a share of the poverty line. Severity of poverty adds more weight to the shortfall of the poorest and thus captures inequality among the poor.

Measures of the depth and severity of poverty follow trajectories similar to the poverty rate (see panels b and c of figure 2.1). In 1990 the depth of poverty was 25 percent using PovcalNet (compared to 23 percent using corrected data), indicating that resources equivalent to 25 percent of the value of the poverty line per person would have been needed to eliminate the shortfall in consumption among the poor. By 2012 this share had fallen to 14–17 percent, depending on the sample used. The severity of poverty also declined, falling from about 12 percent in 1990 (compared to 14 percent using PovcalNet) to 7–8 percent using corrected data (9 percent with PovcalNet).<sup>6</sup>

The trends based on corrected data raise two major concerns, both of which potentially bias the results in a way that may

### **BOX 2.1** Adjusting the data for Nigeria has a huge effect on estimates of poverty reduction

Nigeria is home to 18 percent of Africa's population. As a result, it has a major effect on regional levels and trends in poverty.

Nigeria has conducted household budget surveys since the early 1990s, but design changes made them noncomparable. Since 2003 it has measured poverty by conducting two Nigeria Living Standard (NLSS) and two General Household Survey Panel (GHS-Panel) surveys. Official national poverty measures and PovcalNet use the NLSS 2003/04 and 2009/10.

The NLSS and GHS-Panel are not comparable, and they differ in the quality of implementation (World Bank 2014c). The poverty estimates and trends from the two sources also differ sharply. At the \$1.90 poverty line (2011 PPP), poverty rates from the NLSS 2009/10 (53 percent) are twice as high as rates obtained from the GHS-Panel 2010/11 (26 percent). The NLSS shows no change in poverty between 2003/04 and 2009/10, whereas the GHS-Panel suggests a decline from 26 percent in 2009/10 to 23 percent in 2012/13. Using the GHS-Panel instead of the NLSS changes poverty levels in Nigeria—and therefore the region.

Nigeria's GDP growth rates were higher in the 2000s than in the 1990s. Because GDP is used to fill in data gaps for years when there are no surveys, this

difference also affects changes in poverty. The combination of using imputations and the GHS-Panel instead of the NLSS leads to significant changes in Nigeria and regional poverty trends.

The confidence one can attach to the revised regional series depends crucially on the acceptance of the trends in poverty in Nigeria that are obtained based on the GHS-Panel and GDP growth projections. The recent exercise in rebasing the GDP lends support to the use of the GHS-Panel data, which better describe the link between growth and poverty, urban and rural gaps, the spatial distribution of poverty (World Bank 2014b), and Nigeria's performance relative to its peers. The implied poverty rates in the GHS-Panel suggest that Nigeria is no longer the poorest country in West Africa (as implied by the NLSS).

Additional evidence in support of the corrected data comes from the use of survey-to-survey (S2S) imputations (discussed later in the chapter) rather than GDP projections to look at trends. The imputations using GDP growth suggest that the poverty rate in Nigeria dropped by 12 percentage points between 2004 and 2012. The S2S imputations using GHS-Panel consumption suggest a 10 percentage point decline for the same period (Corral, Molini, and Oseni 2015).

**TABLE 2.1 Addressing quality and comparability reduces the surveys available for poverty monitoring**  
(percent of total data points available from surveys)

Estimates	1990–94	1995–99	2000–04	2005–09	2010–12
PovcalNet	13.5	11.6	15.3	16.7	17.8
Comparable surveys only	1.4	4.7	9.3	13.5	14.7
Comparable and good-quality surveys only	1.4	3.7	7.0	12.1	17.1

Note: Number of data points needed in all periods was 215, except in 2010–12, when 129 were needed because there are 3 instead of 5 years in the period.

exaggerate poverty reduction. One is the influence of the adjustments for poor-quality surveys in Nigeria (box 2.1), which affects the level of poverty. The other is the extent to which GDP imputations are used to fill in gaps, which has the potential to influence trends.

The number of survey-based estimates for annual poverty rates in Africa is small (table 2.1). Between 1990 and 1994, for example, only 13 percent of the 215 data points needed for 43 countries were based on a survey estimate under PovcalNet—and the share is much smaller if comparability and quality are taken into account. Coverage rates are low in other periods as well, although since 2005 the share of actual data used in PovcalNet and the adjusted data has converged. Restricting the revised poverty estimates to comparable surveys of reasonable quality reduces the number of surveys used from 143 to 74. By design, the removal of noncomparable and poor-quality data increases the number of imputations and reliance on GDP.

Relying on GDP estimates to fill survey data gaps entails several important assumptions. First, models assume that all aggregate income growth is consumed. This assumption may overestimate the magnitude of a decrease in poverty during periods of high growth (when savings result) or overestimate the increase during periods of major downturns (when people can draw on savings to smooth consumption). Second, they take for granted that growth is shared equitably across households, either nationwide or within sectors of activity, an assumption that is not always supported by empirical evidence. Third, GDP data are prone to their own quality and measurement problems (Jerven 2013; Deaton 2005).

## Robustness to Reliance on GDP Imputation

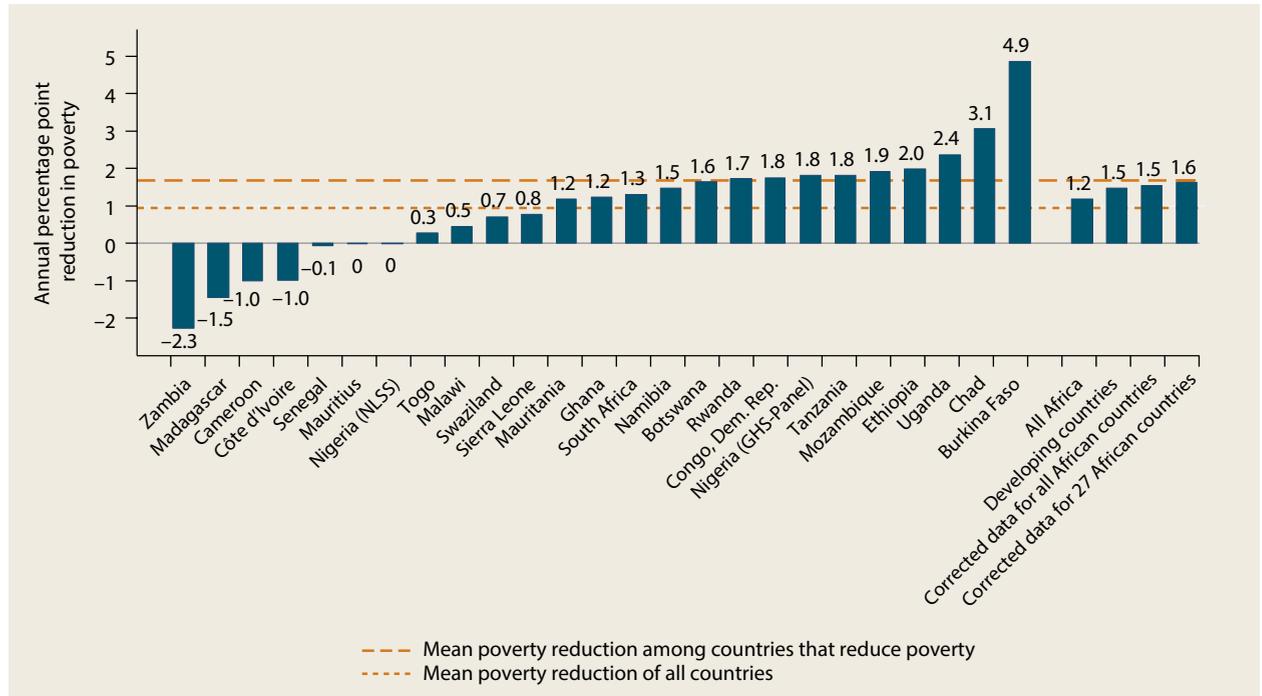
To check the robustness of alternative estimates of poverty trends to the reliance on GDP imputations, we present three illustrative sources of evidence on trends. The first is the selection of a sample of countries in which two or more comparable and relatively good-quality surveys are available. The second approach, survey-to-survey (S2S) imputations, also entails imputations, but of a type that does not rely at all on GDP. The last illustration addresses one additional potential source of bias in the trends: the role that prices have played since 2002.

### Comparable Spells Data as a Robustness Check

Between 1990 and 2012, very few countries in Africa conducted more than two consumption surveys that are comparable and of good quality. Having a large pool of countries with such data would have allowed us to assess the GDP-heavy imputation trends against actual data. Only three countries (Ethiopia, Ghana, and Uganda) have data that pass this test, which is too small a sample to make general conclusions. However, data for 24 countries—out of the 27 countries that conducted at least two comparable surveys during this period—are available.<sup>7</sup> Figure 2.2 shows the average annual percentage point reduction in poverty between comparable surveys for these countries.

Poverty reduction varied widely across countries. In four countries poverty increased,<sup>8</sup> in three it stagnated;<sup>9</sup> in the other two-thirds, it fell 0.3–4.9 percentage points a year. More than half of the countries

**FIGURE 2.2** Analysis based only on comparable surveys suggests that poverty reduction in Africa was faster than previously thought



Source: Data for individual African countries are from World Bank Africa Poverty Database. Developing country data are from PovcalNet.

Note: Positive values denote a reduction in poverty, while negative values denote an increase. The survey years are as follows: Botswana (2002 and 2009), Burkina Faso (1998 and 2003), Cameroon (2001 and 2007), Chad (2003 and 2011), Democratic Republic of Congo (2004 and 2012), Côte d'Ivoire (2002 and 2008), Ethiopia (1999 and 2010), Ghana (1998 and 2005), Madagascar (2001 and 2010), Malawi (2004 and 2010), Mauritania (2000 and 2008), Mauritius (2006 and 2012), Mozambique (2002 and 2008), Namibia (2003 and 2009), Nigeria (2003 and 2009 [Nigeria Living Standards Survey] and 2010 and 2012 [GHS-Panel]), Rwanda (2000 and 2010), Senegal (2005 and 2011), Sierra Leone (2003 and 2011), South Africa (2005 and 2010), Swaziland (2000 and 2009), Tanzania (2000 and 2007), Togo (2006 and 2011), Uganda (1999 and 2012), and Zambia (1998 and 2006). Nigeria GHS-Panel data are shown but were not used to estimate averages. Data on all Africa and developing countries are for 1999–2012. “Corrected data for 27 African countries” reports poverty estimates based on comparable and good-quality data for countries with data from at least two comparable surveys, excluding Nigeria. “Corrected data for all African countries” shows average based on comparable and good-quality data for all of Africa.

reduced poverty by more than 1 percentage point a year. On average these 24 countries achieved an annual rate of poverty reduction of 0.92 percentage points. In contrast, the corrected data suggest an average annual poverty reduction rate of 0.8 percentage points between 1990 and 2012 for Africa. Annual poverty reduction for the developing world as a whole, using uncorrected data, is 1.5 percentage points.

Except for a few countries (Ethiopia, Ghana, and Uganda, where the earliest surveys started in the first half of the 1990s), most of these comparable surveys were conducted during the 2000s. Limiting the analysis to surveys in the 2000s does not change the results: the implied average poverty

reduction from actual data remains about 1 percentage point a year. By contrast, the rate of poverty reduction based on only comparable and good-quality surveys and GDP imputations to fill the data gaps for both all countries and the 27 countries for which comparable data are available is about 1.6 percentage point a year in the 2000s—a much higher rate of poverty reduction than the actual data imply. The corrected data are heavily influenced by the data on Nigeria. Excluding Nigeria reduces the implied poverty reduction obtained from corrected data to 1.2 percentage point a year, which is closer to the poverty reduction rate of 1 percentage point a year based on actual data if Nigeria is excluded for the entire period.

These 24 countries represent 75 percent of the total population of Africa and 83 percent of its poor. The list includes large and small countries, some that fell into conflict between surveys, coastal and landlocked countries, and countries with different levels of resource endowments. The experience of these countries arguably captures the experiences of countries in the region. The poverty estimates suggest that the average annual poverty reduction from these surveys is reasonably close to the rate obtained from an appropriate comparison of poverty estimates based on GDP imputations.

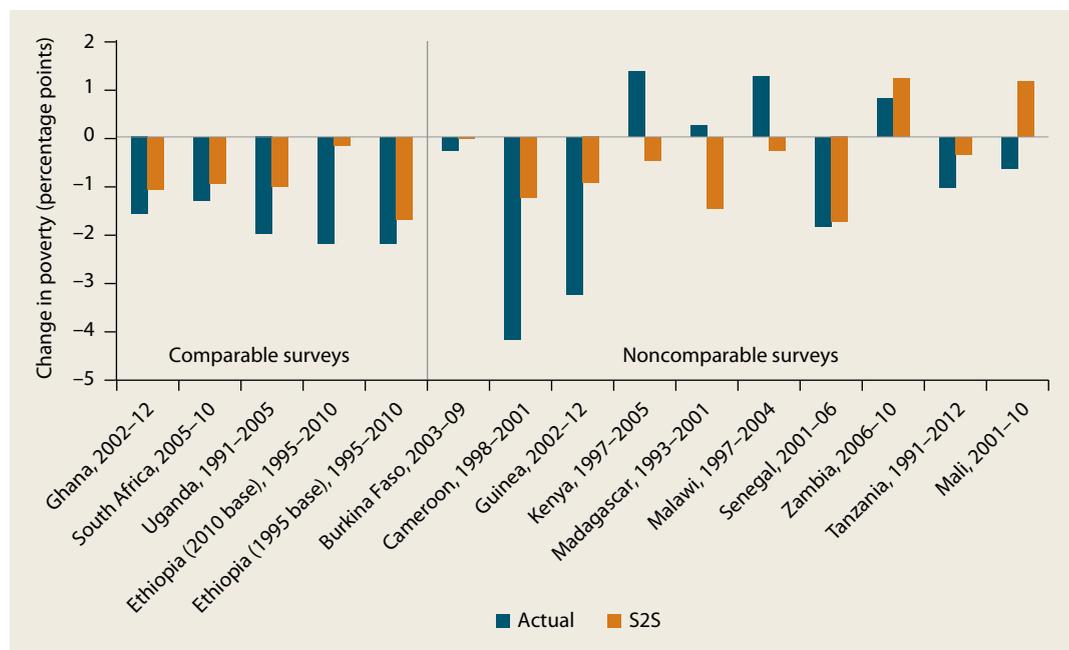
### Survey-to-Survey Imputation as a Robustness Check

Instead of using GDP growth rates to fill gaps in consumption survey data, the S2S imputation takes advantage of nonconsumption household surveys. Survey-based imputation techniques have a long tradition in

economics and statistics. They have been used to recover missing values of one or more variables because respondents did not provide the needed information, the data were corrupted, or errors that cannot be ignored arose during the measurement of variables. S2S imputations are attractive in Africa because they can address the challenges posed by the noncomparability of surveys, the poor quality of consumption data, the low frequency of consumption surveys and the paucity of poverty data points, and missing or poor-quality price data. Validation of S2S imputation against actual poverty trends based on reliable data suggests that the method can track poverty well, provided there are no major economic turnarounds and the periods are not too far apart (Christiaensen and others 2012; Doudich and others 2013).

Figure 2.3 illustrates how an S2S imputation can be used to estimate a poverty trend and why accounting for comparability is

**FIGURE 2.3** Survey-to-survey imputation and evidence from comparable surveys provide similar estimates of poverty



Source: World Bank Africa Poverty database.

Note: The end year is used to impute the start year, except in Ethiopia, where, because the imputation was sensitive to the choice of the base year, both results are reported. The set of covariates used to model consumption includes traits of the household head (education, occupation, employment status), household demographics, housing and asset ownership, location (rural and urban), and interactions with other variables. For S2S, the povimp stata command was used (for details see Dang and Nguyen 2014).

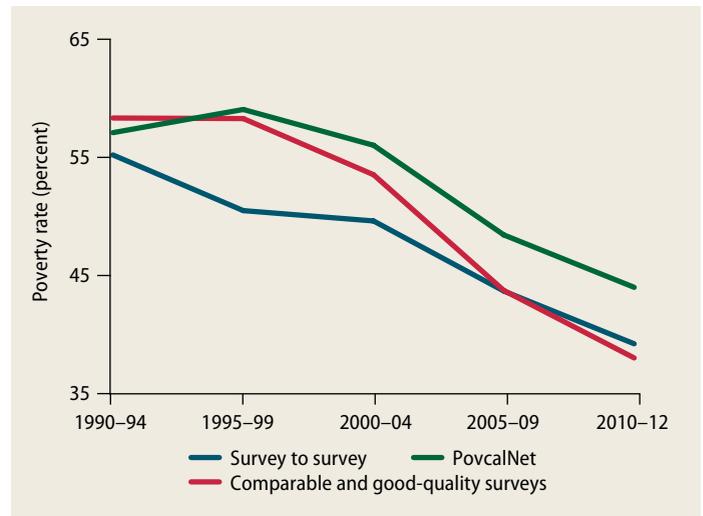
important. It presents poverty estimates for 10 countries in which surveys are not comparable and 4 in which the surveys are comparable. The results lead to two conclusions. First, for comparable surveys, imputed and actual changes are in the same direction, and the estimates are similar in magnitude (in 3 out of 5 spells). This finding provides some validation of the S2S method.

Second, trends derived from noncomparable surveys are not very reliable. Estimates based on the S2S imputation reverse the poverty trends in 4 of the 10 countries, and the size of the gap between actual and S2S predicted poverty is substantially larger for noncomparable surveys than for comparable surveys. These findings underscore the potential importance of the exercise underpinning figure 2.1, where comparability is taken into account.

We applied the S2S approach to the largest 23 countries in Africa in order to check the robustness of trends that are largely dependent on GDP imputations.<sup>10</sup> For these countries, the S2S model was calibrated on a recent good-quality consumption survey and the estimated parameters applied to the poverty predicting (nonconsumption) variables from other consumption and nonconsumption surveys (including, for example, from the Demographic and Health Surveys [DHS]). For each country, at least one data point was obtained for each of five periods: 1990–94, 1995–99, 2000–04, 2005–09, and 2010–15. Annual estimates were not possible, because of insufficient survey coverage. When there was no suitable survey in a period, the most recent available estimate in the preceding or subsequent period was used.<sup>11</sup> If neither was available, a regional average poverty rate from countries with available imputations was assigned.<sup>12</sup>

Figure 2.4 shows population-weighted average poverty rates for each period. Because there is only one data point per country in each period for the S2S, a period's point estimate is assumed to be the average for a country in that period. These averages were then used to obtain an average regional estimate for the period. These estimates are compared with the regional estimates for the largest 23

**FIGURE 2.4** Survey-to-survey imputations suggest that poverty in Africa is lower than household survey data indicate



Source: World Bank Africa Poverty database.

Note: Sample includes the 23 largest countries in the region. The S2S line shows the estimate in the period based on available surveys and the S2S method described in the text. The comparable and good-quality line shows the trend using corrected data for these 23 countries, and PovcalNet line shows the PovcalNet estimate for these 23 countries.

countries obtained using five-year averages for each period using PovcalNet and data from comparable and good-quality surveys.<sup>13</sup>

The S2S approach suggests a 16 percentage point decline in the poverty rate (from 55 percent in 1990–94 to 39 percent in 2010–12), only slightly higher than the 13 percentage point reduction estimates from PovcalNet (from 57 percent to 44 percent) but lower than the 20 percentage point estimate based on the data corrected for comparability and quality.

The regional poverty estimates obtained from the S2S lead to two additional observations. First, the S2S imputation approach predicts lower poverty rates throughout the period. Second, discrepancies between the poverty rates estimated using S2S, the rates based on the PovcalNet and comparable and quality-corrected data are largest in the late-1990s; they narrow in the 2000s. The S2S results hint at the possibility that the results from both PovcalNet and the comparable and quality-corrected data provide a distorted picture of the extent of poverty reduction in the region—PovcalNet because it fails to account for the noncomparability and poor quality of surveys and the corrected

data because they rely too heavily on GDP imputations.

### The Role of Price Adjustments in Measuring Poverty

Consumer price indexes (CPIs), which are used to estimate real consumption in 2011 (the base year of the poverty line) may not have taken full account of the inflation

associated with the food and fuel crises that occurred during the period under study (1990–2012) (box 2.2).<sup>14</sup> CPI basket weights typically reflect the expenditure patterns of wealthier households, which spend a much smaller share of their budgets on food than the average poor family does. If food prices increase much more quickly than general consumer prices, CPIs may underestimate the true inflation experienced by the poor. In

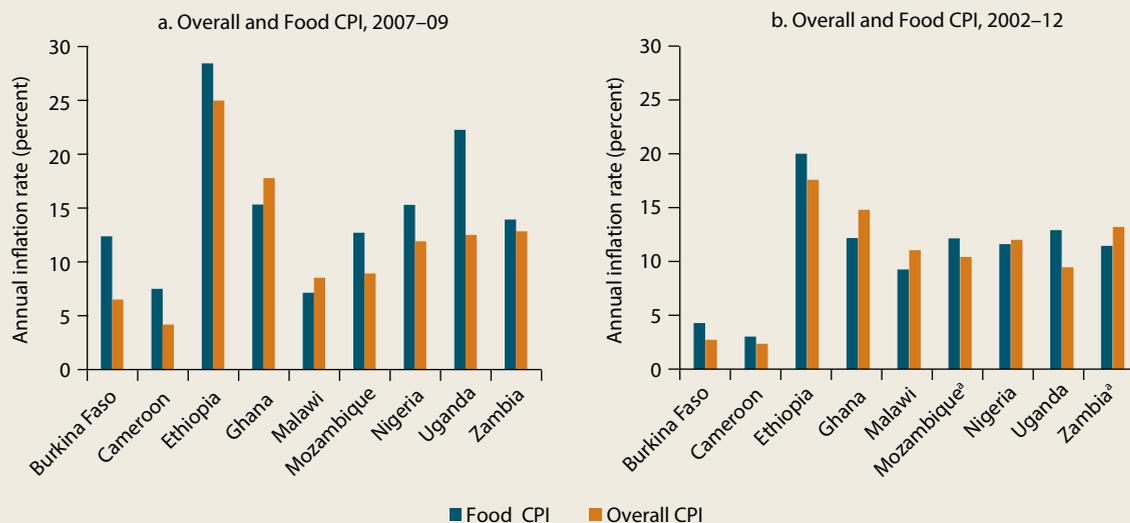
## BOX 2.2 How do spikes in food prices affect the measurement of poverty?

Poverty estimates indicate that poverty reduction accelerated beginning around 2002. One concern with this finding is that the CPIs in the 2000s may have understated the sharp rise in food prices, especially for major staples such as maize, wheat, and rice, observed in 2007/08 and 2011.

A comparison of trends in food prices and the overall CPI in African countries with long-run CPI series highlights the effect of the 2007/08 food price crisis. Most countries experienced significantly higher food price inflation over this period than over the 2000s as a whole. Between 2007 and 2009, food CPIs increased more quickly than general CPIs in seven of nine countries (figure B2.2.1, panel a).

For the longer period (2002–12, panel b), food CPIs increased more quickly than the general CPIs in Burkina Faso, Ethiopia, Mozambique, and Uganda and less quickly in Ghana, Malawi, and Zambia. In Nigeria—which, because of its large population, has a substantial effect on the regional trend—the two inflation rates almost coincide. It is possible that these patterns would look different if price deflators that are more tailored to the consumption patterns of the poor than the food CPIs had been used. But the evidence suggests that the broad increase in poverty reduction after 2002 is not merely a reflection of a failure to account for rapidly rising food prices.

FIGURE B2.2.1 Food inflation does not always exceed overall inflation



Sources: Databases of the International Labour Organization (<http://laborsta.ilo.org/STP/guest>) and the Food and Agriculture Organization (<http://faostat3.fao.org/download/P/CP/E>).

a. Series for Mozambique and Zambia run only through 2011.

this case, the rate of poverty reduction will be overstated. There are other reasons, outlined in chapter 1, why CPIs may not accurately depict the inflation experience of the poor. If CPIs do not adjust correctly for price increases, the measurement of poverty will be flawed. An underestimated (overestimated) CPI will overstate (understate) poverty reduction. In terms of the level of poverty, when adjusting a survey from before 2011 forward to 2011, if the CPI is overestimated, the poverty rate in the year before 2011 will be underestimated. When adjusting a survey from after 2011 back to 2011, an overestimated CPI will cause the poverty rate in the year after 2011 to be overestimated.

How does correcting for these biases affect poverty rates (and trends)? There are two broad approaches to investigating biases in the CPI and reassessing poverty rates and trends. One approach uses item-level price data (for example, unit record data from the consumer price collection) to check for aggregation errors, experiment with different weights, and perform more detailed demand estimations to approximate the relative contribution of various sources of CPI bias (see, for instance, Boskin and others 1996; Diewert 1998; Hausman 2003).

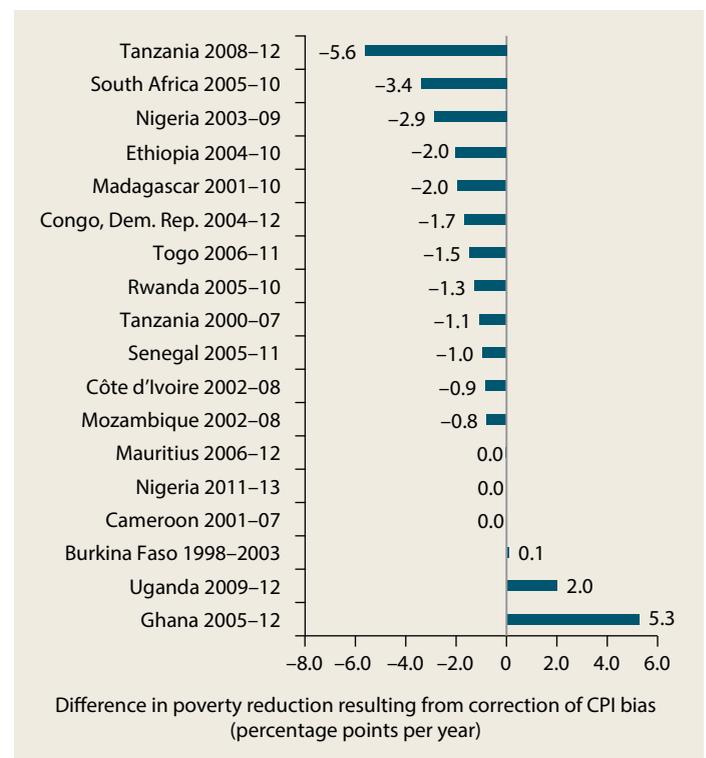
An alternative approach exploits the empirical regularity that food budget shares decline as consumption increases—that is, they act according to Engel’s law.<sup>15</sup> Accordingly, provided that nominal consumption has been measured consistently over time, differences in the food budget share among demographically similar households with the same level of consumption at different points in time indicate the CPI’s mismeasurement of the true change in cost of living (Costa 2001; Hamilton 2001). Any wedge between the estimated changes in real consumption derived from demand functions for food (that is, Engel curves) and measured changes in real consumption (that is, CPI-deflated nominal consumption) is attributed to CPI measurement bias in this approach.

The Engel approach is applied to comparable surveys from 16 countries to estimate the direction and magnitude of CPI bias.<sup>16</sup> Because CPI data collection is often restricted

to urban areas, only urban households are used for these estimations, except for Ethiopia, Mauritius, Nigeria, and Rwanda.<sup>17</sup> The estimation of the CPI bias in Africa follows the methodology outlined in Gibson, Stillman, and Le (2008) (for a review of these methods, see also Gaddis 2015). This approach is based on the assumptions that (a) food and nonfood consumption are measured consistently across surveys and without serious measurement error and (b) preferences remain stable over time.

Unobserved time-varying factors that are correlated with the food budget share could also potentially bias the estimates. They may also explain why the Engel curve method has been shown to perform poorly when comparing cost of living differences across space—such as regions or provinces (Gibson, Le, and Kim 2014).

**FIGURE 2.5** Correcting for CPI bias suggests that poverty reduction is underestimated



Source: World Bank Africa Poverty database.

Note: A negative value indicates that the CPI underestimates the reduction in poverty (or in few cases, overestimates the increase in poverty). A positive value denotes the opposite.

Figure 2.5 displays estimates of the extent of CPI bias for pairs of surveys. The later year in each pair was used as the reference; the implied poverty rate that corrects for the size of the bias during the period of the surveys was computed for the other year. Estimates of poverty reduction from the Engel curve and the CPI are then compared.

The Engel curve estimates suggest that CPIs in Africa tend to overstate increases in the cost of living.<sup>18</sup> In 11 countries, the cost of living for an average urban household rose by less than what is suggested by the official CPI. (For a detailed discussion of the estimation see Dabalen, Gaddis, and Nguyen 2015). The difference in annualized poverty reduction between the Engel method and CPI updates ranges from about 5 percentage points in Ghana to almost -6 percentage points in Tanzania. Burkina Faso, Ghana, and Uganda are the three countries whose estimated differences are positive, although for Burkina Faso the difference is not statistically significant. This means that CPI updates in these countries understate the increase in the cost of living (and therefore overstate poverty reduction) for the period studied. The size of the divergence in Nigeria depends on which survey is used. The poorer-quality survey (Nigeria Living Standard Surveys 2003/04 and 2009/10) yields a 3 percentage point difference in poverty reduction between the CPI and Engel methods, implying that the CPI overstates cost of living and therefore understates poverty reduction; the higher-quality survey (Nigeria GHS-Panel 2011 and 2013) yields no difference between the two methods.

The 16 countries in figure 2.5 represent 70 percent of the African population. The results imply that on average, CPI updates understate poverty reduction by 1 percentage point a year.<sup>19</sup> They also provide prima facie evidence that poverty in many African countries may have declined more quickly than indicated by trends in international poverty rates.

These estimates come with an important caveat, however. The Engel curve estimates do not necessarily imply that CPIs provide biased estimates of general inflation. CPIs, by design, capture inflation faced by households in the 70th or even 80th percentiles. By

contrast, the Engel curve captures inflation rates of a household whose position in the distribution is unknown. Some of the measured difference in poverty reduction between the two methods may reflect differential growth in the inflation of the households represented by these deflators.<sup>20</sup> The large differences in poverty rates the two methods yield in some countries suggest that more work is needed to corroborate the Engel curve estimation results. Ideally, such work would extend these overall bias estimates by examining the CPI product list using the method suggested by Hausman (2003).

### **Asset Ownership as a Measure of Poverty Trends**

Given the low frequency and measurement problems common to consumption surveys (discussed in chapter 1), might other sources of data offer a substitute for consumption? Some efforts have focused on using asset ownership as an alternative measure of consumption change and a means to track poverty.

Assets as a proxy for consumption or income have several advantages that have made them popular since the 1990s.<sup>21</sup> First, nonconsumption household surveys containing asset information covering many countries and years, such as the Demographic and Health Survey, have become available. Data on assets are easier to collect than data on consumption, which require detailed questionnaires. Second, the asset approach avoids the need to monetize values, which requires price data.

Although they find that assets have a robust correlation with nonincome dimensions of poverty (including nutrition, health care use, educational enrollment, fertility, and child mortality), Filmer and Scott (2012) show that the correlation between consumption and asset indexes is weak. Assets and asset indexes are more strongly correlated with consumption in urban areas and in settings in which transitory shocks are mild, measurement error in consumption is limited, and the share of privately consumed goods, such as food, in consumption is small.

These factors are likely to lead to a weaker correlation between assets and consumption in Africa than in other settings. Howe and others (2009) assess the correlation between asset indexes and expenditure in 36 datasets and conclude that the indexes are a poor proxy for consumption data.

Assets have been frequently used to rank households in country-level analysis and then differentiate households in the poorest and richest quintiles. Can assets also be used to assess poverty levels and trends? There are several methodological concerns about using assets to monitor poverty. First, households may increase their assets in the absence of consumption growth (“asset drift”) (Harttgen, Klasen, and Vollmer 2013). Second, the ability to accumulate assets varies substantially across countries for reasons that may have little to do with the ability to purchase them. Populations in two countries that are

equally poor may accumulate different levels of the same asset because of various factors, including conflict, trade restrictions on the asset, or poor provision of a public good that is highly complementary to the asset (unreliable electricity would reduce the acquisition of refrigerators, for example). Third, because assets are stocks, having more assets reflects both current and past consumption or income. Fourth, the extent to which households opt to accumulate assets may be a function of alternative means of saving or storing wealth, which varies across countries.

A fifth concern is the challenge of setting a poverty line based on asset indexes. For consumption measures, there is a cost-of-basic needs anchor. In contrast, there is no consensus on the minimum set of assets needed to meet basic needs. Moreover, there is no consensus on how to aggregate assets (box 2.3). The choice of which assets to include in the

### BOX 2.3 Can wealth indexes be used to measure changes in poverty?

Three indexes measure asset ownership.

#### The DHS Wealth Index

The Demographic and Health Survey (DHS) wealth index is the most commonly used asset index. It is constructed from a large set of household assets and utility services in the DHS and includes country-specific items (Rutstein and Johnson 2004). This index is a standardized score with a mean of 0 and a standard deviation of 1. Principal component analysis is used to assign the indicator weights to each asset or service. Because the number of assets or utility services and the weights change over time and across countries, this index is not comparable across surveys within a country, over time, or between countries.

#### The International Wealth Index

To circumvent concerns about varying the assets included in an asset index across countries and years, the international wealth index is constructed from a small set of common assets. Principal component analysis is used to determine the asset weights (Smits and Steendijk 2015). Countries are weighted by the square root of population size; the weighted

wealth score is rescaled to range between 0 and 100. If a new asset or a new country is introduced, the index needs to be recalibrated. Although not identical, this index is highly correlated with the DHS wealth index. Its correlation with consumption is low (0.5) for the two countries for which it was evaluated (Malawi and Niger) for this report.

#### The Comparative Wealth Index

The comparative wealth index aims to make existing country-specific DHS wealth indexes comparable with one another, to enable trend analysis within and across countries (Rutstein and Staveteig 2014). The approach adjusts households’ country-specific DHS wealth index based on the country-level relationship between some “unsatisfied basic needs” and ownership of four assets (car, refrigerator, fixed telephone, and television) relative to a reference country. For each survey, thresholds for ownership of the assets are determined using a logistic regression, and unsatisfied basic needs are estimated based on the cumulative distribution of unsatisfied needs. These thresholds are regressed against the thresholds for the reference country and the coefficients used to reweight the national wealth index for each survey.

index, how to weight them, and what weights to choose matters, because survey-specific asset indexes are tailored to the asset patterns in a particular country for a specific year. The most common index, the national wealth index (NWI), relies on statistical procedures (for example, principal component analysis) to determine weights. Even within countries, such an approach to weighting is sensitive to the choice of assets for the index calculation. The result is a lack of comparability over time and across countries (Abreu and Johnson 2013; Gwatkin and others 2007; McKenzie 2005). Weights matter because different countries often hold assets that are different in type or quality. They have a strong bearing on whether the index shows a close correlation with consumption.

We explore some of these issues and examine the patterns of accumulation for five privately held assets (television, refrigerator, computer, motorbike, and car), without indexing them into an aggregate indicator. Following the approach of Harttgen, Klasen, and Vollmer (2013), we restrict the focus to near-poor households (households with consumption within 5 percent above or below the poverty line).

Table 2.2 shows the results of regressions of asset ownership on consumption, the time-fixed effect, and the country typology using 32 household surveys for 16 countries with two comparable surveys. As consumption rises among the set of near-poor households, they are more likely to own each asset. The country typologies do not indicate a clear

pattern with respect to asset ownership conditional on household consumption level; but the statistically significant correlations indicate that, conditional on consumption, context partly drives asset ownership. This finding speaks to the concern about identifying a set of assets across countries that is consistently associated with monetary poverty. As indicated by the coefficient on the time indicator, asset ownership of each of the five assets increased from the earlier to later survey, conditional on household consumption, suggesting asset drift.

For this set of countries as a whole, there is evidence of asset drift, but there is variation across countries. The share of countries displaying asset drift is about 50 percent for television ownership, 36 percent for motorbikes, 33 percent for computers, 20 percent for refrigerators, and 10 percent for cars. This evidence is consistent with the size and significance of the time indicator in pooled country results in table 2.2.

Data on assets may be useful in specific ways as a proxy for consumption, such as ranking households within a survey. But given the methodological concerns and the limited empirical evidence, these data do not seem to offer a robust alternative to consumption data for measuring poverty and its trends.

## Profiling the Poor

This section provides a brief description of the profiles of the poor. It begins with

**TABLE 2.2** Many country-level factors affect asset ownership of the near-poor

Item	Television	Refrigerator	Computer	Motorbike	Car
Consumption	0.378***	0.335***	0.004	0.164	-0.062
Middle income	0.202***	0.123***	0.003	0.082***	0.011**
Resource rich	-0.015**	-0.081***	-0.003*	0.070***	0.027***
Landlocked	-0.014	-0.067***	-0.007	0.001***	-0.008**
Fragile	0.108***	-0.048***	-0.008**	-0.019***	-0.012***
Later survey	0.113***	0.014***	0.007***	0.068***	0.019***
Number of observations	16,884	16,847	12,269	15,678	11,859

Source: World Bank Africa Poverty database for recent surveys of Botswana, Cameroon, the Democratic Republic of Congo, Côte d'Ivoire, Ethiopia, Ghana, Madagascar, Malawi, Mozambique, Nigeria, Rwanda, Senegal, Sierra Leone, South Africa, Tanzania, and Uganda.

Note: Sample is households with consumption within 5 percent above or below the poverty line. Consumption is the log of consumption per capita (PPP 2011). Other variables are indicators taking a value of 0 or 1.

Statistical significance: \* = 10 percent, \*\* = 5 percent, \*\*\* = 1 percent.

identification of the location of the poor using broad country classifications. Then it looks at urban and rural patterns within countries, and concludes with a discussion of poverty of female-headed households.

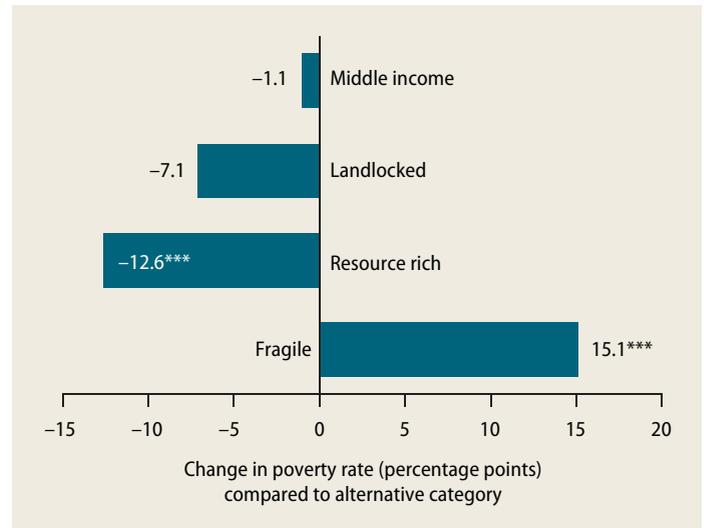
### Differences in Poverty Reduction by Country Typologies

What distinguishes countries that have succeeded in reducing poverty from countries that have not? To answer this question, this section uses corrected data for all African countries and a classification of countries along four dimensions: fragility, resource richness, landlockedness, and low national income. It first examines simple changes in poverty rates between 1996 and 2012 for each country type. It then examines the relationship between country type and changes in poverty conditional on the other classifications, using a simple regression specification.

**Fragility.** The results show that poverty fell even in fragile states, albeit by less than in nonfragile states. Between 1996 and 2012, the poverty rate in fragile countries declined from 65 percent to 53 percent (a 12 percentage point change). This decline was much more modest than the 24 percentage point drop in nonfragile economies (from 56 percent to 32 percent). Some fragile countries are resource rich, landlocked, or both. Therefore, a simple binary comparison between fragile and nonfragile countries is unlikely to capture the contribution to poverty reduction of fragility alone. Conditional on the three other traits (resource richness, landlockedness, and income), poverty reduction for fragile countries was lower than for nonfragile countries by 15 percentage points, and the difference was statistically significant (figure 2.6).

**Resource richness.** Resource-rich countries experience more poverty reduction than non-resource-rich countries: the poverty rate fell 26 percentage points (from 62 percent to 36 percent), compared with 18 percentage points (from 55 percent to 37 percent) in non-resource-rich economies. Conditional on the other characteristics,

**FIGURE 2.6** Fragility is associated with significantly slower poverty reduction



Source: World Bank Africa Poverty database.

Note: Figure shows results of a regression of the change in the poverty rate on country characteristics. Based on estimated poverty rates for 43 countries (1996–2012) using comparable and good-quality surveys.

\*\*\* Statistically significant at the 1% level.

on average resource-rich countries reduced poverty by about 13 percentage points more than non-resource-rich countries. However, a number of surveys were dropped from the set of resource-rich countries because of lack of comparability and quality, increasing reliance on GDP for imputations. To the extent that GDP tracks with consumption surveys less well in resource-rich countries, the rate of poverty reduction will be overestimated.

Empirical evidence on the latter is mixed. For Zambia imputations relying on GDP indicate more rapid poverty reduction, whereas S2S imputations show an increase in poverty. In Nigeria both methods predict roughly the same magnitude of poverty reduction. The main driver of the difference in poverty reduction between resource-rich and resource-poor countries is corrections to the Nigeria data. Nigeria's population share among resource-rich countries (44 percent) is even larger than for the region as a whole (18 percent). Before corrections for comparability and quality, Nigeria's surveys showed slow poverty reduction, despite relatively high GDP growth for more than a decade.

Poverty levels were higher in Nigeria than in many countries at much lower income levels in Africa and the rest of the world. This stagnant poverty rate has been considered an artifact of poor-quality data (World Bank 2014c). With the corrected data, Nigeria's poverty rates are much lower (and closer to countries in its income group) and the decline in poverty steeper, changing the performance of resource-rich countries (see box 2.1).

*Landlockeness.* Some researchers have posited that landlocked countries perform worse than coastal countries because transport costs impede trade and lower competitiveness (Bloom and Sachs 1998; Luke, Sachs, and Mellinger 1999). The results presented here provide no support for this hypothesis. Landlocked countries reduced poverty by 24 percentage points (from 65 percent to 41 percent)—3 percentage points more than coastal countries, where poverty fell from 56 percent to 35 percent. When resource richness, fragility, and income status are controlled for, the difference in favor of landlocked countries widens to 7 percentage points, but this difference remains statistically insignificant.

*Low-income status.* Middle-income countries reduced poverty by 26 percentage points—7 percentage points more than low-income countries. Conditional on other traits, however, they did not perform better than low-income countries (1 percentage point difference).

### Differences in Poverty Reduction by Setting and Gender

Although Africa is urbanizing heavily, its population remains predominantly rural: in the majority of countries, 65–70 percent of the population resides in rural areas (World Bank 2015a). Rural residents have higher poverty rates across countries (figure 2.7).

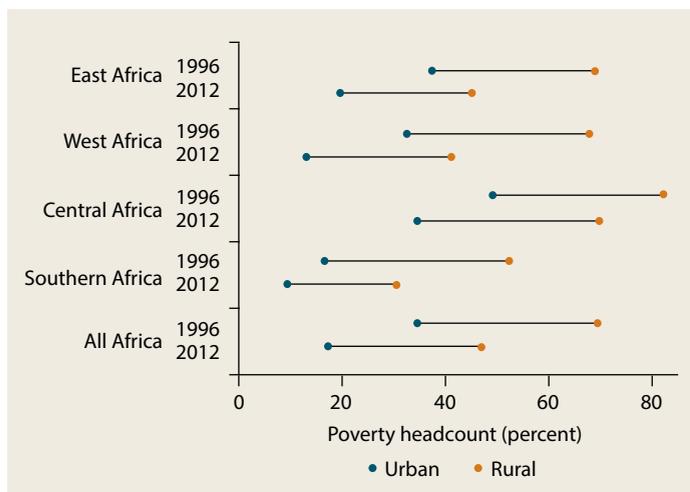
The corrected data for all countries reveal that both urban and rural populations experienced declines in poverty between 1996 and 2012. Urban poverty rates dropped 16 percentage points (a 48 percent decline), and rural poverty rates fell 23 percentage points (a 33 percent decline). The gap in the poverty rate between urban and rural areas also declined (from 35 percentage points to 28 percentage points).

Among the four geographic regions, three of four (East, Southern, and West) have halved (or almost halved) poverty. No rural areas halved poverty. Rural populations in West and Southern Africa experienced declines in poverty of about 40 percent.

Africa is distinguished by the large share of female-headed households (26 percent of all households and 20 percent of all people). Among these households, 62 percent contain no adult men (15 or older).

These statistics hide large variations across countries and regions in Africa (Milazzo and van de Walle 2015). Southern Africa has the highest rate of female-headed households (43 percent). West Africa exhibits the lowest incidence: one household in five is headed by a woman, and female-headed households account for 15 percent of the population. The relatively low rate in West Africa reflects both polygamy and high remarriage rates among widows. Except in Southern Africa,

**FIGURE 2.7** Urban poverty in Southern and West Africa fell by almost half between 1996 and 2012



Source: World Bank Africa Poverty database. Estimates based on data corrected for comparability and quality.

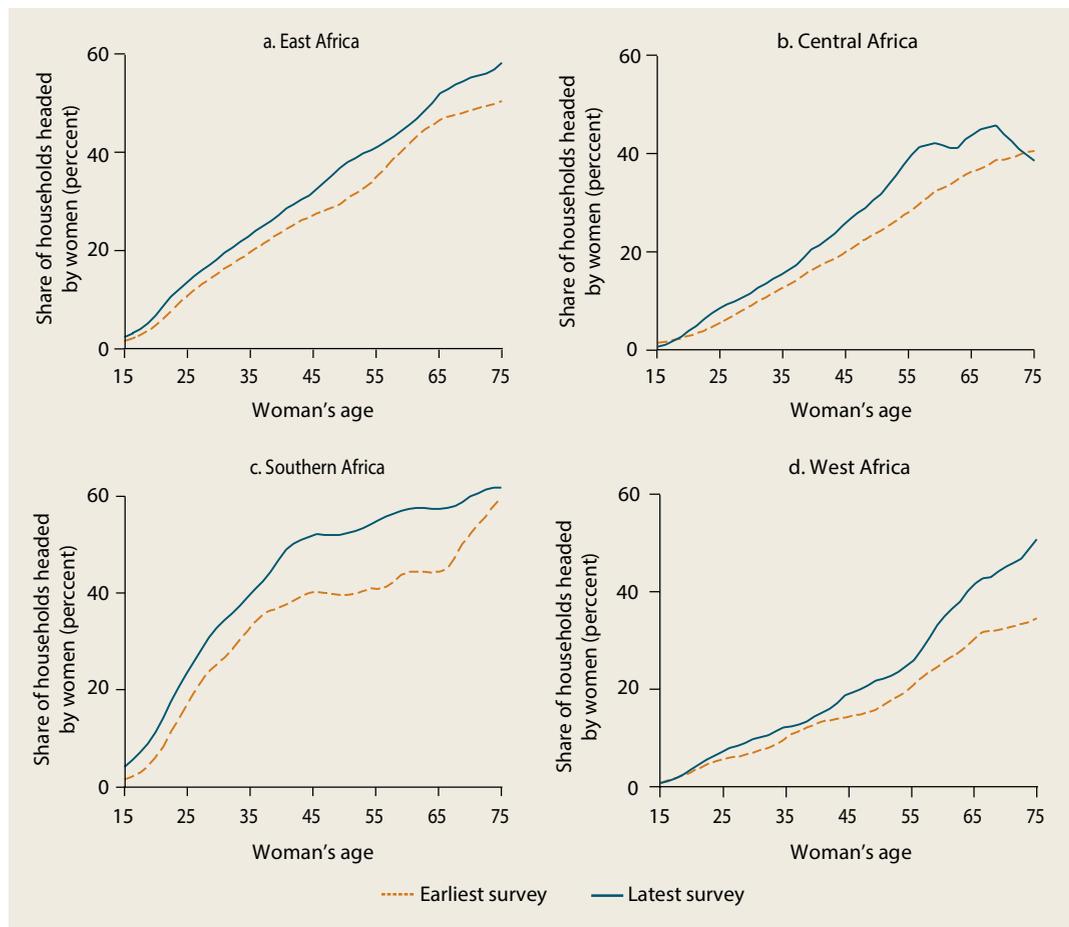
Note: Data are population weighted.

female-headed households are more common in urban areas. Their prevalence is positively correlated with country income status but exhibits no relationship with state fragility or resource wealth.

Both the share of the population living in female-headed households and the share of households headed by women have been rising, across regions and with age (figure 2.8). According to Milazzo and van de Walle (2015), two recent developments across Africa explain this finding.<sup>22</sup> First, although economic growth is found to be

associated with lower rates of female headship, presumably partly explained by lower work-related migration by men associated with growing local economies, there was an Africa-wide annual trend increase of 0.4 percent in the share of the population living in female-headed households (evaluated at the mean share over the entire sample) during the period of growth from the 1990s to 2013. Second, this seeming paradox is resolved by the fact that other things such as demographic and population characteristics, social norms, education, and the nature

**FIGURE 2.8** Across Africa, more and more households are headed by women



Source: Milazzo and van de Walle 2015.

Note: Estimates are from several rounds of Demographic and Health Surveys. Earliest refers to first survey, latest to last survey. East Africa includes Comoros, Ethiopia, Kenya, Madagascar, Malawi, Mozambique, Rwanda, Tanzania, Uganda, and Zambia. Central Africa includes Cameroon, Chad, the Republic of Congo, and Gabon. Southern Africa includes Lesotho, Namibia, and Zimbabwe. West Africa includes Benin, Burkina Faso, Côte d'Ivoire, Ghana, Guinea, Mali, Niger, Nigeria, and Senegal. Zimbabwe is classified here as Southern (instead of East) Africa in order to create large enough country samples for each subregion.

of the family are changing across Africa and encouraging female headship.

Should this steady rise in the incidence of female-headed households cause concern? Do female-headed households tend to be poorer and more vulnerable than others? Female heads are a diverse group that includes widows, divorced women, separated women, abandoned women, married women with nonresident husbands (polygamous or migrant), and single women. Households headed by certain categories of women—widows, divorced or separated women, and single women—frequently appear to be disadvantaged. Widow-headed households are significantly poorer than other households in Madagascar, Mali, Uganda, and Zimbabwe (Appleton 1996; Horrell and Krishnan 2007; van de Walle 2013; World Bank 2014a). But female-headed households that receive transfers from male members have consistently higher consumption or income than male-headed households and are substantially better off than other female-headed households.

Female- and male-headed households differ in terms of demographics in ways that potentially disadvantage female-headed households. On average, female heads are older (reflecting the many widowed heads) and have fewer years of education (4.1 versus 5.1 years). Their households tend to be smaller (3.9 people compared with 5.1 people in households headed by men) but have higher dependency ratios (1.2 compared with 1.0). Female heads are many times more likely to be living in households in which they are the only adult. Three-quarters of male-headed households, compared to just 44 percent of female-headed households, are composed of two adults and children. Female-headed households are also more likely to be single-adult households (16 percent versus 10 percent).

Poverty rates based on household per capita consumption are higher among people living in male-headed households (48 percent) than female-headed households (40 percent). But there are differences across region. By this metric, poverty in Southern Africa is higher among female-headed households;

in East Africa poverty rates are similar in female- and male-headed households.

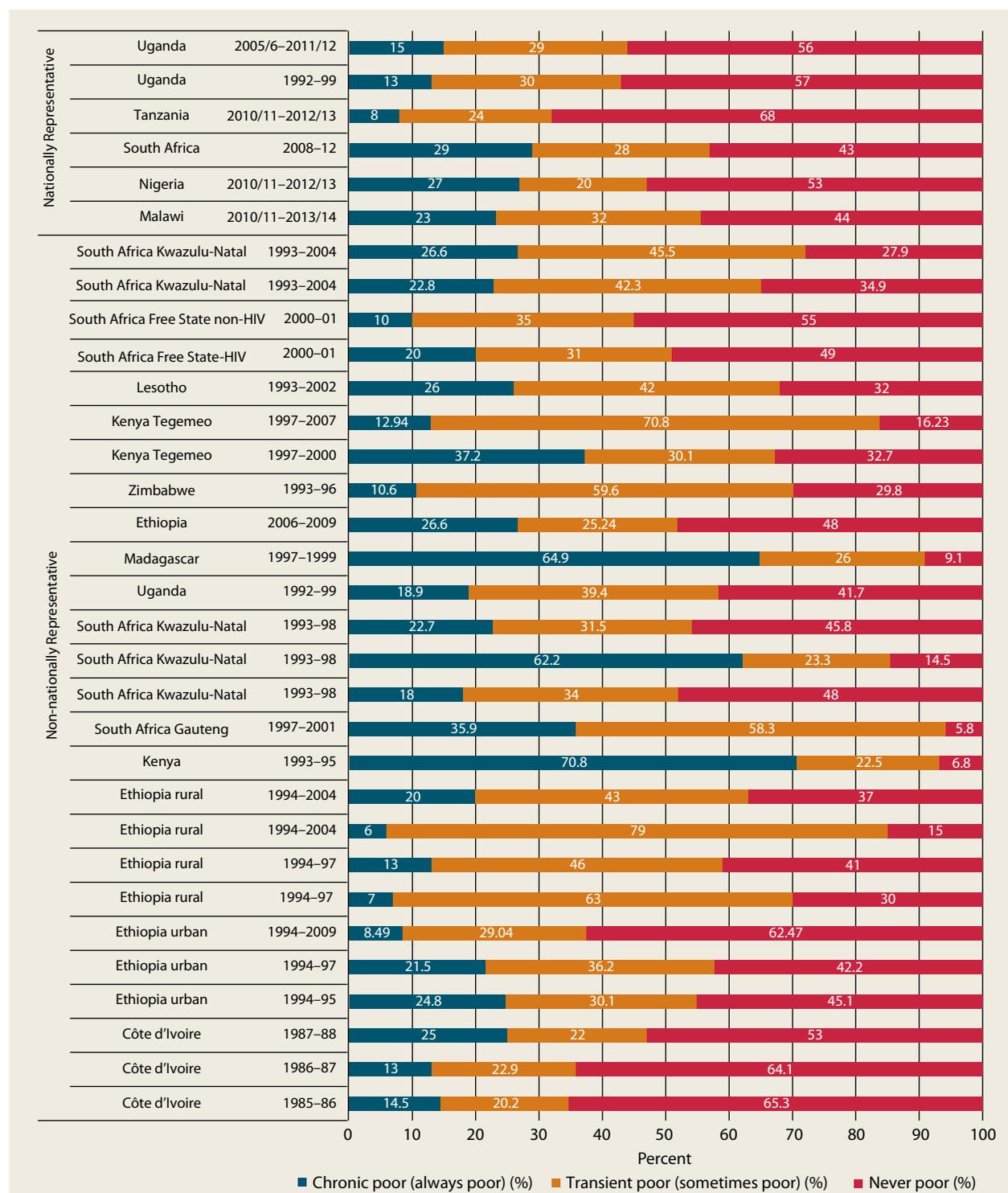
The smaller household size of female-headed households means that using per capita household consumption as the welfare indicator will tend to overestimate the poverty of male-headed households relative to female-headed households if larger households enjoy economies of scale (Lanjouw and Ravallion 1995). Differences in poverty according to the gender of the head thus depend on the consumption indicator used to measure poverty. As the share of female heads continues to grow, this sensitivity to per capita or alternate adjustments for demographic composition may grow with it.

### The Movement of People into and out of Poverty

To this point, this chapter provides a snapshot of poverty at different points in time. It does not describe dynamics—movements into and out of poverty. Many investigations of poverty dynamics rely on panel data, which track households and individuals over time. This analysis is complicated by a host of issues, such as the impact of attrition, measurement error, and sample selection bias (Christiaensen and Shorrocks 2012). In addition, few of the earlier and long-running panels in Africa are nationally representative.<sup>23</sup>

Two main messages emerge from the estimation of poverty dynamics from panel data in Africa. First, perhaps unsurprisingly, there is huge variation in estimates of both chronic and transient poverty (figure 2.9). Chronic poverty estimates range from 6 percent to 70 percent. Chronic poverty estimates for the same country—and in some cases using the same datasets—can also vary widely, depending on the method and the number of spells used.

Second, movement into and out of poverty is substantial: in 20 of 26 studies, transient poverty rates are higher than chronic poverty rates. The median transient poverty rate is about 32 percent while the median chronic

**FIGURE 2.9** Estimates of movements into and out of poverty vary widely across Africa


Sources: Baulch 2011; Duponchel, McKay, and Ssewanyana 2014 (Uganda 2005/06–2011/12); Finn and Leibbrandt 2013 (South Africa, National Income Dynamics Study); World Bank poverty assessments.

Note: Estimates for South Africa are based on Finn and Leibbrandt transition matrixes and a poverty rate of 45 percent using a national poverty line of R620 a month in 2011.

poverty rate is 21 percent, implying that a household or individual is more likely to be sometimes poor than always poor (compare the median of chronic poverty [blue bars] to the median of transient poverty [orange bars] in figure 2.9). Health, labor market, conflict, and weather shocks have been identified as major drivers of these transitions.

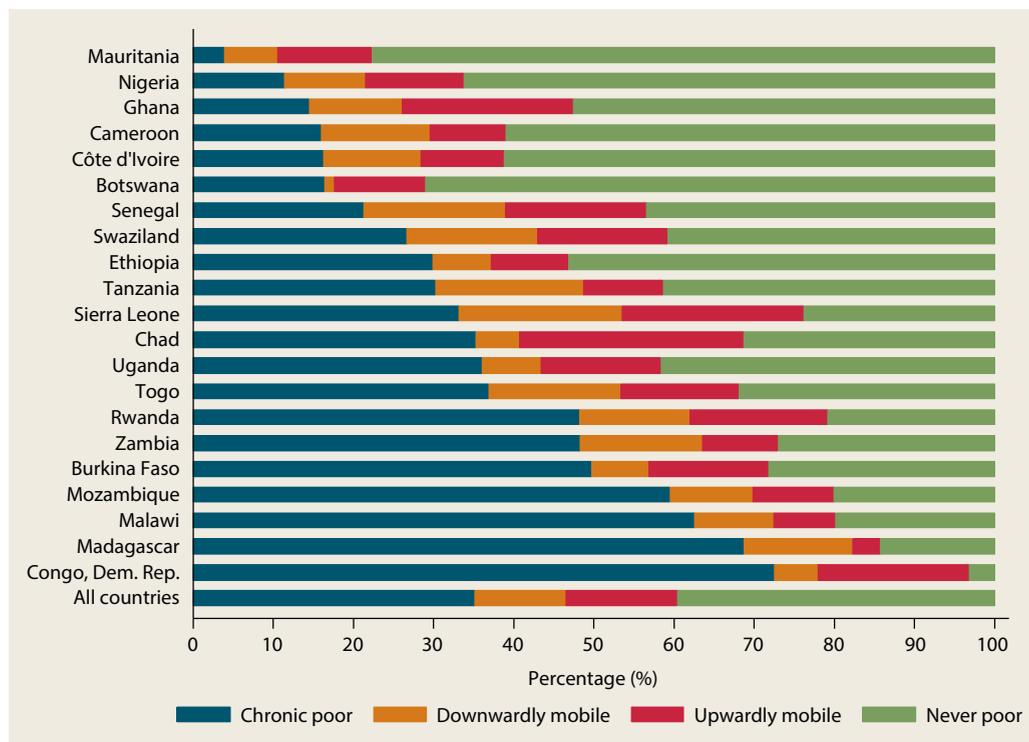
How much of transitory poverty is real and how much reflects measurement error is a matter of debate. According to some researchers, measurement error of income or consumption may explain as much as half of transitory poverty (Dercon and Krishnan 2000; Glewwe 2012).

Revisiting the same household or individual over several years has its advantages, but doing so is costly—the main reason why large, nationally representative panels over long periods are rare. Given the paucity of nationally representative household panel

surveys in the region, an alternative approach to obtaining evidence on the movement into and out of poverty is to use statistical methods to construct synthetic panels from available cross-sections (Dang and Lanjouw 2013, 2014; Dang and others 2014). In addition to generating more data on dynamics, the synthetic panel approach applies the same methodology and uses the same standard and welfare measure for all countries, which is not the case in most panel studies. Synthetic panel data may also be more representative of the population than panel data, which suffer from attrition.

In constructing synthetic panels, we selected countries with comparable surveys. Figure 2.10 decomposed each country’s poverty over time into components: chronic poverty (households that were poor in both periods), downwardly mobile (households that fell into poverty in the second period), upwardly mobile (households that were poor in the first period but not in the second), and never poor (households that were not poor in either period).

**FIGURE 2.10** The share of poor people in Africa who fall into poverty is about the same as the share of poor people who move out of poverty



Source: Dang and Dabalén 2015.

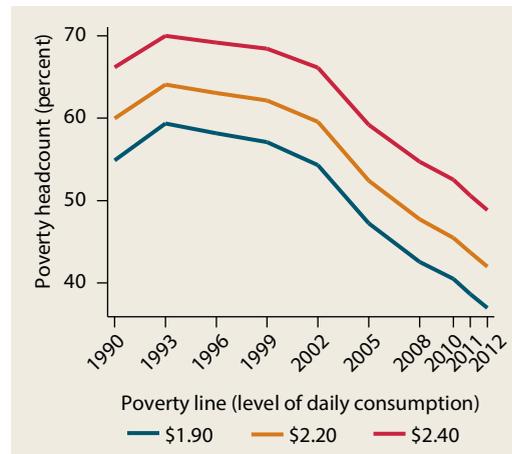
and nonpoor. Rates of chronic poverty vary across countries and do not appear to be linked to overall poverty rates.<sup>24</sup> The nonpoor are further decomposed into two components: households that were upwardly mobile (poor in the first period but not poor in the second period) and households that were never poor (nonpoor in both periods).

Figure 2.10 reveals three aspects of poverty dynamics in Africa. First, on average about 35 percent of the population of a country is chronically poor. These people account for 58 percent of the poor. About 26 percent of the nonpoor population emerged from poverty (that is, were poor in the first period but not the second).<sup>24</sup> This group could be considered vulnerable to falling back into poverty. Second, countries that are similar in terms of poverty rates may be dissimilar in terms of poverty dynamics. For instance, Ethiopia and Senegal both show similar average poverty rates, but the share of chronically poor people is larger in Ethiopia. Third, in some countries with low poverty rates, a large share of the poor are chronically poor. Botswana, for example, has poverty rates that are among the lowest in the sample, but almost all of its poor are chronically so (Dang and Dabalen 2015).

The review of the literature on poverty dynamics and the synthetic panel results depict a situation in which vulnerability is high, as evident from the prevalence of transient poverty. Because Africa's poor appear to be clustered around the poverty line, a small positive shock to incomes could lift many out of poverty, but a small negative shock could drive as many into poverty.

How large is the clustering around the poverty line? Raising the poverty line by \$0.30–\$0.50 (equivalent to a 16–26 percent negative shock to incomes) increases the poverty rate by 5 to 12 percentage points (figure 2.11). Raising the poverty line by \$0.30 in 1990 increases the poverty rate from 55 percent to 60 percent. Raising the poverty line from \$1.90 to \$2.40 (that is by \$0.50—or 26 percent) in 2012 increases the poverty

**FIGURE 2.11** Africa's poor are clustered around the poverty line



Source: World Bank Africa Poverty database. The estimates use data corrected for comparability and quality.

rate by 12 percentage points. Poverty rates have declined, but the level of vulnerability remains very high.

## Concluding Remarks

How much poverty reduction has been achieved since Africa's economic recovery began 15 years ago? The answer has been contentious, partly because the poverty data have not been properly scrutinized for comparability and quality.

Assessment of the data leads to three important conclusions. First, once known data problems are corrected, current poverty rates are lower and poverty reduction at least as large as international poverty estimates suggest. The most comprehensive source of household consumption survey data that provides country and regional estimates of poverty is the World Bank PovcalNet database. According to the surveys available on the database, Africa's poverty rate—defined in this report as people living on less than \$1.90 per person per day (PPP 2011)—was 43 percent in 2012, a 14 percentage point decline since 1990. Accounting for the comparability and quality of data suggests that the decline may have been larger. The adjusted data

imply that the poverty rate could be as much as 6 percentage points lower (37 percent instead of 43 percent) in 2012. Important drivers of the larger decline are corrections to the Nigeria data (which account for a large fraction of the difference between the estimates of the adjusted data and the PovcalNet data) and greater reliance on GDP simulations.

A number of robustness checks support the notion that poverty reduction may have been larger than assumed. Based on spells of comparable surveys only and excluding Nigeria, the implied annual change in poverty using GDP imputation is similar to the one recorded in the data correcting for comparability and quality. The results derived from survey-to-survey imputation methods suggest that the decline was larger than previously thought. This also applies to the S2S results for Nigeria, which supports the notion that poverty in Nigeria declined faster than current official estimates suggest. In addition, results from Engel curve estimation imply that CPIs may overestimate changes in the cost of living and hence underestimate poverty reduction.

Second, although this is good news, the challenge remains substantial; the region did not meet the MDG target of halving poverty by 2015 and many more people are poor in 2012 than in 1990 (even under the most optimistic scenario of poverty reduction). If the pace of poverty reduction does not pick up, it will take the region another decade to reach this target.

A major drag on reaching the goal is fragility. Among the four types of countries assessed—fragile, resource rich, landlocked, and low-income—fragile countries had the slowest rate of poverty reduction. Between 1996 and 2012, this group of countries reduced poverty by 12 percentage points—13 percentage points less than nonfragile countries. Controlling for other characteristics (resource richness, landlockedness, and low-income status) increases the difference in poverty reduction to 15 percentage points.

Third, about 58 percent of the poor in Africa may be chronically poor, although the

lack of panel surveys with national coverage over long periods makes it difficult to establish this fact with certainty. The share of the transient poor (the sum of the upwardly and downwardly mobile), at roughly 25 percent of the population, also suggests a significant share of vulnerable population.

## Notes

1. The term *poverty* is used here to refer to people with consumption levels below the international poverty line. The MDGs use the term *extreme poverty* to describe these people.
2. Some scholars argue, for example, that the African poverty rate has been falling much more quickly than internationally accepted conventional wisdom suggests (Pinkovskiy and Sala-i-Martin 2014; Young 2012).
3. This report does not address the problem of comparability across countries.
4. South Sudan—for which there are no purchasing power parity (PPP) exchange rates and, until recently, no consumer price index (CPI) data—was not included in the regional poverty estimate. No survey data were available for four countries (Equatorial Guinea, Eritrea, Somalia, and Zimbabwe). For these countries, the average regional poverty rate was assigned. Together these countries are home to about 5 percent of the population of Africa.
5. Where there are multiple surveys that are not comparable, only the survey that included the most comprehensive consumption data was used.
6. These poverty trends are robust to changes in country composition. The same imputation methods were applied to two subsamples: the 23 most populous countries and the 27 countries with at least two comparable surveys. For the 23 largest countries, which account for more than 88 percent of the total and the poor population, poverty declined from 55 percent to 36 percent (19 percentage points) based on the comparable and good-quality data and from 57 percent to 43 percent (14 percentage points) based on the full sample of surveys (PovcalNet). Among the 27 countries for which there are at least two comparable surveys, which represent about 76 percent of the population

and almost 80 percent of the poor, poverty dropped from 57 percent to 38 percent (19 percentage points) based on the comparable and good-quality data. As with the pattern among all countries, poverty measures peaked in the mid-1990s and declined more sharply after 2002 when comparable and good-quality data are used.

7. For Burundi, Gambia, and Seychelles, only one of the comparable consumption aggregates is available for use at the time of this report.
8. One of these countries is Zambia, where the finding is based on poor-quality data.
9. One of these countries is Nigeria, where the finding is based on poor-quality data.
10. Because the richness of survey data within and across countries varied widely over time, attempts were made to maintain the same model across time within but not across countries. Overall, for each model four clusters of variables were analyzed: demographics, education of the household head, housing and assets, and rural and urban location.
11. More specifically, if a survey and an estimate for a country were available in the period immediately before or after the period without a survey, the nearest available estimate was used for the period without a survey. For example, Ethiopia conducted a survey in 1994/1995. Assigning the poverty rate from 1994/95 to 1995–99 leaves the 1990–94 period without a poverty estimate for Ethiopia, as there were no surveys during this period. Therefore, we used the estimate from 1994/95 for both 1990–94 and 1995–99, keeping Ethiopia’s poverty rate for that period unchanged. The main goal of the exercise is to avoid using GDP imputations to fill in missing data points and to avoid creating a series that would seem implausible. For instance, there are no surveys for the Democratic Republic of Congo before 2005. In 2005 the extreme poverty rate estimated from survey data was 91 percent. If we assign a regional poverty rate for the period without surveys, the poverty rate in the Democratic Republic of Congo would be half what the actual survey says and would make the country one of the least poor countries in Africa before 2005. To avoid such a series break, for all periods before 2005–09, we were compelled to hold the poverty rate for the Democratic Republic of Congo at the 2005–09 rate.
12. For the period 1990–94, there was no survey coverage or surveys in the immediately following period for 4 of the 23 countries, so regional averages computed from the rest of the 19 countries were used. Similarly, regional averages were used for 3 countries for 1995–99, 2 countries for 2000–04, 1 country for 2005–09, and 1 country for 2010–12.
13. In general, only data that were subject to rigorous vetting (in terms of completeness of the sample and consumption aggregate, proper documentation, and consistency with consumption measures used by countries in their monitoring and analysis) are used in PovcalNet estimates. What is referred to as PovcalNet results here are estimates obtained by applying the methods used in PovcalNet (described in World Bank 2015b) to the vetted data for these 23 countries. We were able to closely replicate the official PovcalNet estimates for the period 1990–2012, in some cases differing only by a decimal point.
14. This discussion focuses on the role of the CPI in adjusting consumption in a given survey year to the benchmark year. Prices also matter for the profile of poverty within a country. For instance, urban-rural poverty gaps may be overestimated if price differences between urban and rural areas are underestimated. Cross-country comparisons—and therefore regional poverty levels and trends—will also be sensitive to changes and adjustments to PPP exchange rates. This section does not address these issues.
15. Engel Law is the observation that, as income rises, the share of income devoted to food falls, even if actual expenditure on food may be rising.
16. Where there are more than two comparable surveys per country, the CPI bias is estimated separately for each subperiod. The estimation is further restricted to countries for which monthly CPI data (food, nonfood, and all-item CPIs) from the national statistical agency are available, as these data are needed to control for relative price changes. The method only partially accounts for the quality change bias and does not capture the consumer surplus arising from the introduction of new commodities (Gibson, Stillman,

- and Le 2008). Plutocratic bias (whereby the CPI gives more weight to the consumption of richer households) is addressed because the results are democratically weighted estimates (that is, use household sample weights that are more representative of their share in the population) among the subsample of urban households and do not weight households according to their total expenditures. Studies on the Russian Federation (Gibson, Stillman, and Le 2008) and Brazil and Mexico (de Carvalho Filho and Chamon 2012) use income as an instrumental variable for consumption to address endogeneity arising from the fact that total consumption enters both sides of the regression equation (that is, when computing budget shares and when controlling for consumption levels). The results suggest that ordinary least square estimates, such as the ones presented here, may suffer from some degree of bias because of correlated measurement error but are unlikely to show a different direction of bias than the instrumental variable estimates. Because many of the household surveys used in this report do not contain income aggregates, endogeneity concerns could not be addressed in the same manner.
17. For Nigeria and Rwanda, urban and rural CPI series were used. For Ethiopia, regional CPI (but collected from urban areas) were used. Finally in Mauritius, urban CPI was applied to rural and urban households during the Engel curve estimation because the household survey does not have urban and rural identifiers.
  18. This finding contrasts with the view of Sandefur (2013), who argues that CPI inflation understates true inflation and hence provides too optimistic a view of poverty reduction in Africa. His analysis is based on a database of national poverty lines that tend to increase (in nominal terms) at a more rapid rate than official CPI inflation. Under certain conditions (related to how these national poverty lines are constructed), the poverty lines he proposes can reveal changes in the cost of living among the poor. However, the vast majority of the poverty lines Sandefur uses do not meet the necessary conditions (see Gaddis 2015) and are therefore inappropriate for inferring price changes between surveys.
  19. Dropping outliers (differences of more than 3 percentage points in absolute value) does not change this result substantially (−1.1 becomes −0.8).
  20. Nakamura, Steinsson, and Liu (2014) show that if inflation rates at different points in the income distribution are similar, the fact that the Engel curve deflator is for one unknown household and the CPI is for another household should not matter: one can attribute most of the gap between the two to genuine CPI bias. And in a recent analysis Hobijn and Lagakos (2005) suggest that, over long periods of time, the CPI inflation rate accurately represents changes in the cost of living for households at different parts of the income distribution.
  21. See Ainsworth and Filmer (2006); Bicego, Rutstein, and Johnson (2003); Bollen, Glanville, and Stecklov (2002); Case, Paxon, and Ableidinger (2004); Filmer and Pritchett (1999, 2001); Gwatkin and others (2000); McKenzie (2005); Rao and Ibanez (2005); Sahn and Stifel (2000); Schellenberg and others (2003); and Stifel and Christiaensen (2007).
  22. This trend is estimated from a regression (the log of the odds ratio) of the share of the population living in female-headed households using 98 country-year DHS surveys covering the last 25 years. Milazzo and van de Walle (2015) report that the trend is explained largely by rising age at marriage and higher education levels.
  23. Since the introduction of the Living Standards Measurement Study–Integrated Surveys on Agriculture, surveys have been nationally representative.
  24. In principle, poverty mobility is likely to be greater over longer intervals (see, for example, Dang and Lanjouw 2014). For these data, however, the Pearson correlation between chronic poverty and the length of time between the two cross-sections is weak (0.35 and not statistically significant).
  25. Notice that the average upward mobility in these countries is about 14 percent and the nonpoor population is around 54 percent (40 percent never poor plus 14 percent upwardly mobile). Therefore, the fraction of the upwardly mobile among the nonpoor is 14/54, which is roughly 26 percent. Similarly, on average about 35 percent of

the poor were poor in both periods. The fraction of the population that was poor at least once in both periods includes the chronic poor (35 percent), the downwardly mobile (11 percent) and the upwardly mobile (14 percent). Therefore, the fraction of the chronic poor among the poor is about 58 percent (35/60).

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