Global Poverty Monitoring Technical Note 8

National Accounts Data used in Global Poverty Measurement

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Abstract

Poverty estimates from household surveys are not available every year for most economies. To address these data gaps and to aggregate poverty estimates across groups of economies (and the world), adjustments to household survey data are needed to align estimates to common reference years. This note summarizes the methods and data used for aligning (or lining up) and aggregating World Bank poverty estimates to common reference years. The data and methods presented here are the ones used in PovcalNet as of 2019, and build on the approach described by Chen and Ravallion (2004), and also documented in Ferreira et al. (2015), Jolliffe et al (2014) and World Bank (2018). The note summarizes the methodology, as described in these sources and implemented in PovcalNet, and the current data sources used.

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1. Introduction

The World Bank's poverty estimates for the world, geographic regions and other groupings of economies are available for selected years – currently from 1981 to 2015.[1] We commonly refer to these years as "reference years". Given that poverty estimates for each country are not available every year, adjustments of the survey data are needed to provide estimates for these common reference years, before estimates can be aggregated to regional, global or other aggregate estimates for groups of economies or countries.

Consider the case of estimating global poverty at $1.90 for 2015. The PovcalNet database contains more than 1800 income and consumption distributions from 164 economies for years ranging from 1977 to 2017. However, only 65 distributions are from surveys conducted for the year 2015. For the remaining 99 economies, no survey estimate of poverty is available for 2015, and adjustments of the closest surveys to 2015 are required to provide an estimate for 2015. For example, the latest survey available for Madagascar is from 2012, and for Bhutan we have surveys in 2011 and 2017. To ensure that poverty estimates for as many countries as possible are included in the 2015 estimate, we use the surveys closest to 2015 for each country to estimate poverty in 2015 before aggregating.

It is important to note that the reference year estimates are produced for the purposed of creating aggregates for country groupings for common years. For analyzing country-level poverty and trends, we advise users to rely on estimates for survey-years directly, as is the practice in the World Bank's use of these estimates.

This note summarizes the methods and data used for lining up and aggregating World Bank poverty estimates to common reference years. Section 2 summarizes the methodology. Section 3 documents the national accounts data sources and how these are used.

[1] The 2019 edition of PovcalNet provides reference year estimates for 1981, 1984, 1987, 1990, 1993, 1996, 1999, 2002, 2005, 2008, 2010, 2011, 2012, 2013 and 2015. The plan going forward is to release new estimates every two years.

2. Methods for lining up

National accounts data is available with much higher frequency than household surveys for nearly all economies in the world. The use of national accounts data in adjusting the household survey distribution is grounded in the close conceptual and empirical relationships between growth of consumption and incomes of households and growth in the economy overall.

To align household survey data to common reference years, national accounts data is used to interpolate and extrapolate survey estimates of poverty for economies where survey data are not available in the reference year but are available either before, after, or both. When a survey is available for a given reference year, we simply use that survey for aggregation. However, when a survey is not available, one of the following methods are used for adjusting the survey data, depending on data availability and correspondence between national accounts and the survey data.

2.1. Extrapolation

In the cases where the reference year falls after the latest available survey of a country, or before the first available survey, the income or consumption vector from the closest survey is extrapolated using per capita growth rates from national accounts between the survey year and reference year. For example, for Madagascar, we take the distribution from 2012 and adjust consumption with growth rates from 2012 to 2015, using the real per capita growth in national accounts over this period. Similarly, the first survey for Madagascar is from 1993 and used to provide estimates for reference years for 1990 and earlier using the same method.

The extrapolation of the survey mean from year t_0 to reference year t_r can be summarized as follows.

$$m_{t_r} = \frac{n_{t_r}}{n_{t_0}} * m_{t_0}$$

where m denotes the survey mean and n the national accounts mean. Poverty for the reference year is then estimated using this extrapolated distribution. Using such an extrapolation assumes distribution neutral growth with relative inequality held constant, growing the entire distribution by the same rate.

2.2. Interpolation

In cases where the reference year falls between two surveys, poverty is estimated for the reference year using both extrapolated surveys (before and after the reference year). To adjust estimates to the reference year, one of two approaches are used, depending on the correspondence in growth between national accounts and survey data (and similarly, conditional on both surveys being either both consumption or income surveys).

Interpolation (same direction)

"Same direction interpolation" is used when growth in the survey mean between the two surveys is of the same sign as the real growth from national accounts from the first survey to the reference year, and from the reference year to the second survey. The mean for the reference year t_r, m_{t_r}, is estimated by taking the mean of the two closest surveys before and after t_r (m_{t_0} and m_{t_1}) and interpolating the survey means using national accounts data for periods t_0, t_1 and t_r (n_{t_0}, $n_{t_1}$and n_{t_r}). The interpolation formula is as follows

$$m_{t_r} = \frac{m_{t_1} - m_{t_0}}{n_{t_1} - n_{t_0}} \left(n_{t_r} - n_{t_0}\right) + m_{t_0}$$

After this alignment, there are two distributions both which have the same mean for the reference year but different rates of poverty since their distributions are unchanged from their reference point. The estimate of poverty from these two distributions is the weighted average poverty rate from both distributions where whereby each poverty estimate is weighted by the inverse of the relative distance between the survey year and the reference year. If a reference year falls two years after he first survey and one year after the second survey, the poverty estimate from the first survey is given a weight of 1/3 and the estimate from the second survey a weight of 2/3.

Interpolation (diverging directions)

If the growth rates in surveys and national accounts diverge, an approach similar to the extrapolation is applied to the two closest surveys. Poverty for the reference year is estimated using both distributions and the estimates are averaged using weights inverse to the distance

between the survey year and the reference year. The mechanics of the extrapolation and interpolation are described in box 6.4 in Jolliffe et al. (2015) and in Appendix A of World Bank (2018).

2.3. Limitations

The use of national accounts data to impute poverty estimates for the reference years has two main limitations. First, it is well-established that the relationship between growth in survey means and national accounts is imperfect, and that national accounts often grows faster than surveys (Ravallion, 2003; Deaton, 2005). Thus, using national accounts aggregates to predict survey growth may lead to a bias that exaggerates poverty reduction compared with growth observed in surveys alone. Second, the methods assume that inequality remains unchanged. These limitations are of particular concern for the extrapolations in which the adjustments are only made in one direction. The first issue could be mitigated by scaling down the observed national accounts growth rates by a passthrough factor, as is done for the World Bank's poverty projections to 2030 (see World Bank, 2018, p. 22,), and in the near future we expect to reconsider and align our methods for using passthrough factors.

3. Sources of National Accounts Data

Two national accounts indicators are used: Household final consumption expenditure (HFCE), also referred to as personal consumption expenditure (PCE) and Gross Domestic Product (GDP). We use the series in per capita terms and in constant prices (typically constant USD).

HFCE is the component of national accounts that is conceptually closest to the economic activity typically captured by household surveys. It is the market value of all goods and services, including durable products, purchased by households. It excludes purchases of dwellings but includes imputed rent for owner-occupied dwellings. Household consumption expenditure typically also includes the expenditures of non-profit institutions serving households. Thus, this is our preferred national accounts series for interpolating and extrapolating the survey data.

However, for some countries, particularly in Sub-Saharan Africa, HFCE estimates at constant prices are more sparse. Furthermore, the empirical correlation between growth in HFCE and survey mean is weaker in this region than elsewhere (Ravallion, 2003). Therefore, GDP is the preferred source for lining up poverty estimates for economies in Sub-Saharan Africa. For all other economies, HFCE is preferred, but if it is not available, GDP is used.[2] GDP is a measure of the economy as a whole, not only the household sector, but is also closely correlated to the economy ofthe household sector.

National accounts data from three sources is used. When national accounts data from different sources are combined, they are linked to the primary series to create a continuous series. They are linked such that growth rates in both series are unchanged. Such linking is only possible if the series are overlapping.

3.1. World Development Indicators

The primary source is the World Development Indicators (WDI) database and specifically the series "Households Final Consumption Expenditure per capita (constant 2010 US$)" [Series code NE.CON.PRVT.PC.KD] and "GDP per capita (constant 2010 US$)" [Series code NY.GDP.PCAP.KD]. The WDI data comes from the World Bank and OECD compilations of national accounts series. For the March 2019 update, the principal source is the December 2018 edition of WDI. The current 'vintage' used is reflected in the most recent "What's New" note.

3.2. Maddison Project Database

For country-years where WDI does not have national accounts data, we rely on GDP per capita in constant prices from the Maddison Project Database (MPD), as described in Bolt et al (2018).[3] Angus Maddison's database provides the broadest coverage of comparative historical national income data in the world. In recent years the development of the Maddison Project Database (MPD) is managed by The Groningen Growth and Development Centre (GGDC). The data is

[2] If HFCE is not available for either of the reference years or the survey years, GDP is used.
[3] We use the $RGDPNApc$ variable expressed in constant prices using only one benchmark year

available at https://www.rug.nl/ggdc/historicaldevelopment/maddison/. As of March 2019, The MDP data substitute PovcalNet's historical national accounts data from various sources, that were insufficiently documented and maintained. The change to MDP as the main source of historical national accounts data has led to some revisions in aggregates, particularly in the 1980s. We only use MDP data for years where WDI is missing data prior to the year 2000.

3.3. Country-specific series

In a few cases, national accounts data may not be available for all years in the latest version of WDI or MDP, or the available data may be deemed inappropriate or erroneous. In a few cases, therefore, a country-specific series from other sources are used. These can come from national statistical sources, research papers, or other versions of the data. For each update, the country-specific national accounts sources used to supplement the most recent WDI and MDP data are described in the "What's New" note and the full overview of national accounts data used available in an appendix to that note.

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