Global Poverty Monitoring Technical Note 3

Prices used in Global Poverty Measurement

Joao Pedro Azevedo, Paul A. Corral, Dean M. Jolliffe, Christoph Lakner, Daniel Gerszon Mahler, Jose Montes, Minh C. Nguyen and Espen Beer Prydz

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Abstract

To compare welfare aggregates over time and across space, the World Bank's global poverty estimates incorporate temporal and spatial price adjustments, as well as currency changes. This short note summarizes these adjustments in a simple framework and provides the basis for more detailed papers documenting each of the components.

All authors are with the World Bank. Corresponding authors: Christoph Lakner (clakner@worldbank.org) and Minh C. Nguyen (mnguyen3@worldbank.org). The authors are thankful for comments and guidance received from Shaohua Chen and Francisco Ferreira, and to Ruoxuan Wu for excellent research assistance. This note has been cleared by Francisco Ferreira.

1. Introduction

This short note provides a framework for the price adjustments that are incorporated in the World Bank's global poverty estimates.[1] These include temporal and spatial price adjustments, as well as adjustments for changes in currencies, as explained in more detail below. This note provides the basis for several separate notes that document each of the price components in detail, including the precise sources used. For example, Lakner et al. (2018) and Atamanov et al. (2018) document the consumer price indices (CPIs) and purchasing power parities (PPPs), respectively.

2. A Generalized Price Framework for Global Poverty Measurement

The World Bank's global poverty estimates are based on welfare aggregates from more than 1,600 different surveys across the world, conducted over the past 40 years. The global poverty measurement exercise takes these welfare aggregates in current local currency and converts them to constant PPP-adjusted dollars. If $1 can purchase more goods in Nigeria than in the U.S., then this must be accounted for. Likewise, if 1,000 Nigerian Naira can purchase fewer goods today than was possible 10 years ago, this must be accounted for before poverty levels can be compared over time.

The conversion into constant PPP-adjusted dollars includes three main components that jointly make the welfare aggregate comparable within countries, over time and across countries: 1) temporal deflation (adjusting for changes in price levels over time), 2) spatial deflation (accounting for differences in price levels across space, within a country and at a given point in time) and 3) currency adjustment (capturing changes in currency). Formally, the price vector can be written as

$$Price_{c,a,t^r,t^e,t^b,t^{PPP}} = T^{WS}_{c,t^e,t^b} \times S^{WC}_{c,a,t^b} \times T^{BS}_{c,a,t^b,t^{PPP}} \times A^{BS}_{c,t^b,t^{PPP}} \times S^{BC}_{c,t^{PPP}} \quad (1)$$

Before explaining each of these five components, some notation is useful:

- c denotes a country.

[1] Chapter 6 in Jolliffe et al. (2015) provides an overview of the various data sources that are used in the World Bank's global poverty measures.

- a denotes an area within a country, such as a region, province or urban/rural.
- t^r denotes the welfare reporting year, which may not be the same as the survey year. Some surveys, such as the EU-SILC (the European Union Statistics on Income and Living Conditions), collect income for the previous calendar year, so the welfare is reported for the year prior to the survey ($t^r = t^d - 1$, where t^d is the survey year).[2]
- t^e denotes the time of enumeration for a particular household within a survey.
- t^b denotes a common time period to which all welfare aggregates within a survey are supposed to have been deflated. This may be a month, a range of months or a year. In most cases, t^b is identical to the welfare reporting year t^r, or a month within that year. It is also important to point out that in some cases, the welfare aggregates have not been deflated to a common time period within a survey (in these cases $t^b = t^r$).[3]
- t^{PPP} is the International Comparison Program (ICP) reference year of PPPs (currently 2011).
- The superscripts refer to within- and between-survey (WS and BS), within- and between-country (WC and BC) adjustments.

The five components of the price vector are as follows:

i. T^{WS}_{c,t^e,t^b}: Within-survey temporal adjustment

When households are interviewed at different points in time and asked about their current expenditure or income, temporal CPIs are often used to bring the welfare aggregate to a common time period, t^b. This ensures that price changes within the span of the fieldwork are not influencing welfare comparisons, i.e. this adjustment ensures temporal comparability within the survey period.

[2] Estimates in PovcalNet are referred to by their welfare reporting year, so the estimates based on the 2016 EU-SILC are recorded as 2015.

[3] One reason is that the time of enumeration or the reference month of the aggregate may not be available. In these cases, we implicitly assume that the survey fieldwork was spread out evenly across the year, such that using the annual CPI provides a reasonable approximation.

Most welfare aggregates that feed into PovcalNet have already been adjusted to t^b as part of the harmonization efforts by the Poverty Global Practice.[4] In some surveys, particularly when the time of enumeration, t^e, is unknown, this component is not used (i.e. $T^{WS}_{c,t^e,t^b} = 1$).

ii. S^{WC}_{c,a,t^b}: Within-country spatial adjustment

Price levels may differ across space within a country at a particular point in time. For example, housing prices are often lower in rural areas than in urban areas. Such differences need to be captured in order for welfare aggregates to be comparable within a survey.

In the World Bank's global poverty estimates, the within-country spatial price adjustment differs across countries and in some countries no adjustment is made (Ferreira et al., 2016). A forthcoming paper will document the current practices in more detail.

Jointly, the first two components assure that welfare aggregates are comparable within a survey.

iii. $T^{BS}_{c,a,t^b,t^{PPP}}$: Between-survey temporal adjustment

Once the welfare aggregates have been converted to a common time period, t^b, and made comparable across regions, changes in consumer prices are used to bring the price level to the PPP reference year, t^{PPP} (currently 2011). This component adjusts for changes in the price level between two surveys.

PovcalNet primarily uses *national* CPIs, although in China and India inflation rates differ between urban and rural areas. Lakner et al. (2018) explain the between-survey temporal adjustments that are used in each country.

iv. $A^{BS}_{c,t^b,t^{PPP}}$: Between-survey currency adjustment

In some surveys, the inflation rate from t^b to the reference year of the ICP (t^{PPP}) does not capture all the relevant price developments that have occurred. This is particularly the case if a country

[4] These harmonization efforts may also include a temporal deflation of the various components of the welfare aggregate, when these are collected over different reference periods. Such adjustments are not captured in equation 1.

has devalued its currency between t^b and t^{PPP}, or if it has changed its currency during this time interval. In these cases, a scalar relating the old currency regime to the new currency regime is used to make the t^{PPP} prices comparable to the t^b prices.

Jointly, the first four components assure that welfare aggregates are comparable across surveys within a given country.

v. $S^{BC}_{c,t^{PPP}}$: Between-country spatial adjustment

This component adjusts for differences in price levels across countries, i.e. how much a dollar can purchase around the world. With the welfare aggregates expressed in t^{PPP} local 2011 prices, between-country PPPs are used to convert the price levels to an internationally comparable standard.

For almost all countries, PovcalNet currently uses the ICP 2011 PPP exchange rates for household final consumption expenditure (WDI code PA.NUS.PRVT.PP), which compare the purchasing power across countries in 2011. Atamanov et al. (2018) explain the PPP exchange rates in more detail and explains in which countries alternative PPPs are used.

3. Summary

This note explained the five components that make the welfare aggregates used for global poverty monitoring comparable across countries and over time. The first two components of the price vector, T^{WS}_{c,t^e,t^b} and S^{WC}_{c,a,t^b}, make welfare aggregates comparable within a survey. $T^{BS}_{c,a,t^b,t^{PPP}}$ and $A^{BS}_{c,t^b,t^{PPP}}$ adjust for changes between surveys, i.e. these adjustments are required for making a country-trend meaningful. Finally, $S^{BC}_{c,t^{PPP}}$ accounts for differences in the price level across countries, which is necessary for comparing welfare aggregates with a common international poverty line. For a particular survey-year, some components may not be needed; for example, if no currency adjustment took place between 2011 and t^b, $A^{BS}_{c,t^b,t^{PPP}}$ will equal one.

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