

# September 2018 PovcalNet Update

## What's New

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## Abstract

The September 2018 update to PovcalNet involves several changes to the data underlying the global poverty estimates. Some welfare aggregates have been changed for improved harmonization, and some of the CPI, national accounts, and population input data have been revised. This document explains these changes in detail and the reasoning behind them. Emphasis is given to the updates to the Indian poverty estimates. In addition to the changes listed here, 24 new country-years have been added, bringing the total number of surveys to 1601.

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## 1. Introduction

The September 2018 global poverty update from the World Bank presents new poverty estimates for 2015, and revises the previously published global and regional estimates from 1981 to 2013. The update includes new surveys that have been received and processed, as well as several changes to the existing data. Some changes reflect improvements in the welfare aggregate based on new harmonization efforts and more available information. This document outlines the changes made to the underlying data by country, and explains the reasons why the changes have been made.

Table 1 shows the global and regional poverty estimates for 2015, which are presented in more detail in the 2018 Poverty and Shared Prosperity report (World Bank, 2018). In 2015, an estimated 736 million people were living below the international poverty line, currently set at \$1.90 in 2011 purchasing power parity (PPP) U.S. dollars. The global poverty rate, the share of the world's population living below the international poverty line, stands at 10%, while 26% live on less than \$3.20 and 46% live on less than \$5.50. Sub-Saharan Africa accounts for more than half of the world's population below the international poverty line and has the highest regional poverty rate, at 41%.

**Table 1.** Poverty estimates for reference year 2015, different poverty lines

Region	Survey coverage (%)	\$1.90		\$3.20		\$5.50	
		Head-count ratio (%)	Number of poor (mil)	Head-count ratio (%)	Number of poor (mil)	Head-count ratio (%)	Number of poor (mil)
East Asia and Pacific	97.6	2.3	47	12.5	254	34.9	710
Europe and Central Asia	89.9	1.5	7	5.4	26	14.0	68
Latin America and the Caribbean	89.8	4.1	26	10.8	68	26.4	165
Middle East and North Africa	64.6	5.0	19	16.3	61	42.5	158
South Asia	21.4	n/a	n/a	n/a	n/a	n/a	n/a
Sub-Saharan Africa	52.7	41.1	413	66.3	667	84.5	849
Other High-Income Economies	71.7	0.7	7	0.9	10	1.5	16
World Total	66.7	10.0	736	26.3	1933	46.0	3386

Source: [PovcalNet](#)

Note: Survey coverage is assessed within a two-year window either side of 2015, i.e. including surveys that were conducted between 2013 and 2017 (see section 5 below). The estimates for South Asia are not displayed since the region has a survey coverage less than 40%.

Table 2 illustrates the impact of the data updates on global poverty for the reference year 2013. The estimates for 2013 were first published in October 2016, and have since been revised in October 2017 and April 2018. With the new data, the estimate of the global \$1.90 headcount ratio increased from 10.9% to 11.2% and the number of poor increased from 783 million to 804 million people. The additional 21 million poor people at the global level can be largely explained by a revision of the line-up methodology in India (see section 6.2 for details), which increases the estimated number of poor in India by 17 million (from 210 to 227), and increases the headcount ratio in South Asia from 15.1% to 16.2%. The remaining change is mostly explained by a new survey in Kenya in 2015.67.<sup>1</sup> This new survey adds more than 2 million poor people in Kenya compared to the previous estimate, which was based on an extrapolation of the 2005.38 survey. Apart from India and Kenya, no country had its estimate change by more than half a million poor people.

**Table 2.** Poverty at reference year 2013: Comparison of April and September 2018 versions

Region	\$1.90: Headcount ratio (%)		\$1.90: Number of poor (mil)		\$3.20: Headcount ratio (%)		\$3.20: Number of poor (mil)		\$5.50: Headcount ratio (%)		\$5.50: Number of poor (mil)	
	Apr	Sep	Apr	Sep	Apr	Sep	Apr	Sep	Apr	Sep	Apr	Sep
	2018	2018	2018	2018	2018	2018	2018	2018	2018	2018	2018	2018
East Asia and Pacific	3.6	3.6	73	73	17.6	17.5	352	352	42.5	42.4	853	852
Europe and Central Asia	1.6	1.6	7.7	8	5.8	5.8	28	28	14.1	14.1	68	68
Latin America and the Caribbean	4.5	4.6	28	28	11.3	11.4	69	70	27.1	27.2	166	167
Middle East and North Africa	2.7	2.6	9.6	9	14.5	14.4	52	51	42.7	42.3	153	152
South Asia	15.1	16.2	257	274	52.6	53.9	894	916	83.5	84.2	1418	1431
Sub-Saharan Africa	42.3	42.5	401	405	67.5	67.8	639	645	85.2	85.4	807	813
Other High-Income Economies	0.6	0.6	6.4	6	0.9	0.8	9.5	8.9	1.5	1.5	16	16
World Total	10.9	11.2	783	804	28.6	28.8	2044	2072	48.7	48.7	3481	3498

Source: [PovcalNet](#)

Note: The increase in the number of poor at the \$5.50 line, without any change in the headcount ratio, can be explained by rounding and an upward revision of the population total due to the inclusion of Eritrea and Taiwan, China (see Section 5).

<sup>1</sup> The decimal year notation is used when data are collected over two calendar years. The number before the decimal point refers to the first year of data collection, while the numbers after the decimal point show the proportion of data collected in the second year. For example, the 2015.67 Kenya survey was conducted in 2015 and 2016 with two thirds of the data collected in 2016. Also see footnote 3 in Atamanov et al. (2018) and Lakner et al. (2018) for details.

## **2. Changes to welfare aggregates**

### **2.1. Bhutan 2003**

The 2003 data have been updated with a new version of the data and a revised consumer price index (CPI). With the new welfare aggregate, the Gini index declined from 46.78 to 40.9. Introducing the new aggregate and the new CPI caused poverty at \$1.90 to decline from 36.22% to 21.33%.

### **2.2. EU-SILC data**

All historical EU-SILC data have been updated to data released in March 2018. The updates for each country-year are documented on the [Eurostat website](#) [CIRCABC → Eurostat → EU-SILC → Library → data\_dissemination → udb\_user\_database]. The following country-years were revised (referring to the reference year of the welfare aggregate): Croatia (2015), Iceland (2014), Netherlands (2015) and Sweden (2007-2013). The effects on the poverty estimates and other distributional statistics are minor.

### **2.3. LIS data**

The Luxembourg Income Study (LIS) is a database of harmonized microdata from 50 countries from around the world. PovcalNet uses the disposable income variable from the LIS database for seven countries: Australia, Canada, Germany, Israel, Japan, South Korea, and United States.

Disposable income is given as the sum of labor income, capital income, public transfers, private transfers, less taxes and contributions. Pending further research on harmonizing the treatment of negative incomes across our database, we exclude households with negative disposable income. Disposable income is expressed in per capita terms without applying equivalence scales (as is the case with all other surveys used in PovcalNet).

LIS does not distribute the microdata, so PovcalNet includes grouped data generated from the LIS microdata (via the LIS remote execution system). Since the April 2018 update, the method to generate grouped data for the seven LIS countries has been updated such that it is consistent with how grouped data are generated for the countries that rely on SILC data. In particular, 400 bins are now created instead of 300 bins (with one exception, see footnote), and the bins are created using Stata's `_ebin` command, developed by Joao Pedro Wagner De Azevedo, rather than Stata's

xtile command.<sup>2</sup> `_ebin` is similar to `xtile`, but they differ in how observations with the same income are treated and `_ebin` generates bins that are more similar in population size. The `_ebin` command can be downloaded by typing `ssc install alorenz`.

#### **2.4. Fiji 2013.24**

New consumption items were added to the welfare aggregate, reducing poverty slightly. As a result of these changes, Fiji's poverty rate at \$1.90 for 2013.24 changes marginally, from 1.39% to 1.37%. The Gini index for the same survey changes from 36.37 to 36.70.

#### **2.5. Kenya**

The methodology used to estimate international poverty in Kenya was revised for consistency across rural and urban households. The Kenya National Bureau of Statistics (KNBS) excludes rent expenditure for all rural households. As a result, for national poverty estimation, two poverty lines are used that account for these differences in the aggregate. Since the international poverty line does not allow for differentiation between urban and rural households, rent expenditures are now excluded also for urban households. The CPIs in Kenya have also been revised (see section 3).

In 2005, the headcount ratio at \$1.90 was revised upwards from 42.8% to 43.6% while the Gini declined from 48.5 to 46.5. In 2015, poverty at \$1.90 changed from 35.8% to 36.8%, with the Gini declining from 42.6 to 40.8.

#### **2.6. Malaysia 2008.25**

The previously included 2009 data have been replaced with data for 2008.25, reflecting updated information about the reference period of the welfare aggregate. Furthermore, the welfare aggregate has been updated to net income from the Household Income Survey. The Gini index and poverty at \$3.20 changed from 46.3 to 45.5 and 3.1% to 4.2%, respectively.

#### **2.7. Rwanda 2010.83 and 2013.75**

The 2010.83 and 2013.75 welfare aggregates are now spatially deflated. This has generated moderate adjustments. The \$1.90 poverty headcount ratio for the 2010.83 survey increased from

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<sup>2</sup> When the bin size does not reach a minimum number of observations, the number of bins is iteratively reduced by 50. For this reason, we use 250 bins in Israel 1979. This has minor implications for poverty estimates.

60.4% to 62.4%, and the Gini index fell from 51.3 to 47.2. For the 2013.75 survey, the \$1.90 poverty headcount ratio fell from 59.5% to 56.0%, and the Gini index fell from 50.4 to 45.1. Since the aggregates before 2010.83 are not spatially deflated, there is now a break in the series. More details can be found in Fatima and Yoshida (2018).

### **3. Changes to CPI data**

The baseline source of CPI data has not been updated from the April 2018 vintage of PovcalNet. It remains the IMF's International Financial Statistics (IFS) as of December 2017.<sup>3</sup> Yet, some changes have been made, primarily to older survey years, where IFS data are not available. Table 3 summarizes the changes to the CPI data as part of September 2018 PovcalNet update. Most of the changes concern using the World Economic Outlook's annual CPI series as the main secondary source whenever IFS data are unavailable, and monthly CPI data are not needed. Lakner et al. (2018) describe the various CPI series that are used in PovcalNet in more detail. For countries not listed in Table 3, there were no changes in the CPI data source.

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<sup>3</sup> A few recent surveys require CPIs for 2017, which are not available in the December 2017 vintage of the IFS. This concerns Bhutan 2017, Gabon 2017, Indonesia 2017, Uganda 2016.5, and West Bank and Gaza 2016.85. In these cases, CPIs for 2017 from more recent IFS vintages are combined with the CPI series from the December 2017 vintage.

**Table 3.** CPI data sources: Comparison of April 2018 and October 2018 versions

Economy	Years	Description of change in CPI data
Argentina	1986, 1987	Switched to CPI from World Economic Outlook
Bangladesh	1983.5, 1985.5, 1988.5	Switched to CPI from World Economic Outlook
Bosnia and Herzegovina	2001, 2004	Switched to CPI from World Economic Outlook
Belize	All years	Switched to CPI from World Economic Outlook
Bhutan	2003	Corrected an error in IFS data
Chile	All years until 2006	Switched to CPI from the ILO
Micronesia, Fed. Sts.	2000, 2005, 2013	Updated CPI from World Economic Outlook
Guinea	1991, 1994.08, 2002.25	Switched to CPI from World Economic Outlook
Guyana	1992.5	Switched to CPI from World Economic Outlook
India	1983, 1987.5, 1993.5, 2004.5	Updated CPI from the National Statistical Office (see 6.1 for additional details)
Iran, Islamic Rep.	1986, 1990, 1994, 1998	Updated CPI from the National Statistical Office
Kenya	1992, 1994, 1997	Updated CPI from the National Statistical Office
Lao PDR	1992.2	Switched to CPI from World Economic Outlook
Lesotho	1986.54, 1994.45	Switched to CPI from World Economic Outlook
Malaysia	2008.25	Change in survey year from 2009 to 2008.25, and weighted CPI changed accordingly. <sup>1</sup>
Mozambique	1996.27, 2002.5	Switched to CPI from World Economic Outlook
Namibia	1993.79	Switched to CPI from World Economic Outlook
Romania	1989	Switched to CPI from Milanovic (1998)
Sierra Leone	1989.75, 2003.25	Switched to CPI from World Economic Outlook
Tajikistan	1999	Switched to CPI from World Economic Outlook
Timor-Leste	2001	Switched to CPI from World Economic Outlook
Uganda	1989, 1992.23	Switched to CPI from World Economic Outlook
Venezuela, RB	All years	Updated CPI from the National Statistical Office

*Note:* (1) The decimal year notation is used when data are collected over two calendar years. For these countries, a weighted average of the annual CPI series is used, where the weights are based on the data collection. See footnote 3 in Atamanov et al. (2018) and Lakner et al. (2018) for details.

#### 4. Changes to national accounts data

The baseline source of national accounts data (per capita GDP and per capita household final consumption expenditure, HFCE) has not been updated from the April 2018 vintage of PovcalNet. It remains the December 2017 version of the World Bank's World Development Indicators (WDI). A detailed technical note to be published on the PovcalNet website will offer a more comprehensive explanation and documentation of the alternative sources used when WDI data are missing.

When more recent national accounts data were needed (e.g. for surveys in 2017), these years were added from the July 2018 vintage of WDI. For Indonesia and the West Bank and Gaza, the national accounts data was chained from 2016 to 2017 due to revision of the series in 2016 or later. For the Maldives, the entire series was updated to the July 2018 version due to large revisions of the national accounts series in the early 2000s. Given the detailed work on revising the line-up procedure (see section 6.2), India's national accounts data were also updated to the July 2018 version.

## **5. Changes to population and survey coverage data**

The baseline source of population data remains the December 2017 version of the WDI, as in the April 2018 vintage of PovcalNet. The total world population has been revised slightly upwards because of four distinct revisions:

1. The following economies have been added to PovcalNet: Andorra, Curacao, Gibraltar, Isle of Man, Nauru, Sint Maarten (Dutch part), St. Martin (French part), Turks and Caicos Islands, British Virgin Islands. Their combined population was 0.49 million people in 2015.
2. For Eritrea, where WDI does not report population in recent years, population estimates from the United Nations World Population Prospects were added for 2012-2017.
3. In the case of Taiwan, China, which was previously missing, population data was added from the National Statistics Republic of China (Taiwan, China).
4. For Kuwait, interpolations have been made between 1991 and 1995, where WDI data were missing. This affects the 1993 line-up.

Population survey coverage has been updated. The criteria for estimating survey population coverage is whether at least one survey used in the reference year estimate was conducted within two years of the reference year.

## 6. Revisions to India's poverty estimates

### 6.1. CPI revisions

Urban and rural CPIs for India have been revised to reflect the most recent data from the Indian Labour Bureau. The revisions primarily impact Indian poverty estimates in the 1980s (surveys in 1983 and 1987.5), but small changes have also been made to the 1993.5 survey and the 2004.5 survey. The biggest change occurred for the 1987.5 rural (urban) survey mean, which was adjusted downwards by 4.8% (6.4%). These revisions have impacts on Indian poverty numbers, as shown in Table 4, and due to India's size, also on global poverty numbers. For example, the change in the 2004.5 CPI leads to small revisions in the 1996, 1999, 2002, 2005 and 2008 line-ups. For more information on the Indian CPIs, see Lakner et al. (2018).

**Table 4.** Revisions of India CPIs: Comparison of poverty headcount ratio (in %, at \$1.90)

Year	Urban		Rural		National	
	Apr 2018	Sep 2018	Apr 2018	Sep 2018	Apr 2018	Sep 2018
1983	34.2	36.2	60.0	60.6	53.9	54.8
1987.5	31.0	35.3	49.3	53.5	44.8	49.0
1993.5	29.8	29.7	51.6	51.6	45.9	45.9
2004.5	25.5	25.4	43.4	43.4	38.2	38.2

Source: [PovcalNet](#)

Note: Survey-year estimates for India not listed in the table remain unchanged.

### 6.2. Revisions to line-up after 2011.5

The latest survey with official poverty estimates for India was conducted in 2011-12, more than three years before the most recent reference year, 2015. The usual methodology for lining-up countries to the reference year is based on two assumptions: the survey mean grows at the same rate as HFCE or GDP per capita, and there is no other change in the distribution.<sup>4</sup> These assumptions may be reasonable when adjusting over a short period of time, but they become

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<sup>4</sup> See Jolliffe et al. (2015, Box 6.4) for a general description of PovcalNet's lining up procedure. The forthcoming technical note on the sources of national accounts data will provide a more detailed documentation.

problematic as the distance between the survey year and the line-up year increases (Jolliffe et al. 2015).

With the usual approach, and with an HFCE growth rate of 21% in India from 2011-12 to 2015, the welfare aggregate for all households in the 2011-12 survey would be given a growth rate of 21%, and poverty in 2015 would be estimated based on this adjusted welfare vector. Given India's importance for the global poverty rate, and the availability of a newer survey (albeit without a full consumption aggregate, see below), it was felt that this extrapolation method needed to be cross-validated.

For this reason, the 2015 poverty estimate for India is based on a new method to estimate the growth rate in HFCE. The new method utilizes a nationally representative survey conducted in 2014-2015 that has similar socioeconomic and demographic information as the 2011-2012 survey, but does not have a full consumption aggregate that can be used for poverty estimation. The 2014-2015 survey contains information on several household characteristics that are also present in past survey rounds and that can be used to predict per capita consumption. These common characteristics include household age, size, caste, religion, a few labor market variables, and expenditures on miscellaneous services, recreation and transport.

Given the unique situation of having essentially the same socioeconomic and demographic data at two points in time, Newhouse and Vyas (2018) use a survey-to-survey imputation method to estimate poverty in 2014-2015.<sup>5</sup> The method first estimates the relationship between per capita household consumption and household characteristics using the data from 2004-2005, 2009-2010, and 2011-2012, which have the full consumption questions as well as the variables used in the model. In a second step, the estimated relationship is applied to the 2014-2015 data to predict household consumption and poverty status.

PovcalNet uses the poverty rates at \$1.90 estimated by Newhouse and Vyas (2018) (10.0% for urban and 16.8% for rural areas) to calibrate the growth rate in survey mean consumption between 2011.5 and 2014.5. The fraction of growth from national accounts that is passed through to growth

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<sup>5</sup> Newhouse and Vyas (2018) follow the general survey-to-survey imputation technique introduced by Elbers et al. (2003). For the estimation program used (`sac` command in Stata) and the associated documentation, see Nguyen et al. (2018a, 2018b).

in the survey mean implied by this procedure is 55.9% for urban India and 73.3% for rural India.<sup>6</sup> It is important to stress that PovcalNet still assumes distribution-neutral growth, but relaxes the assumption that the growth in HFCE per capita is fully transmitted to the survey mean.

With this approach, the total growth rate in the survey mean between 2011.5 and 2014.5 is 9.6% in urban India and 12.6% in rural India. This growth rate is distributed to the annual intervals (2012-2014), which are needed for the intermediate line-ups, in proportion to the growth in HFCE observed in national accounts.<sup>7</sup>

The new method used for India marks the first time that PovcalNet uses inputs from a survey-to-survey imputation method. In the coming years, when countries do not have surveys with full consumption modules, but have other smaller surveys with partial coverage, similar methods may be applied to obtain more timely poverty estimates. Needless to say, household surveys with full consumption modules are undoubtedly the preferred approach, and only in exceptional cases will imputation approaches be relied upon.

Table 5 summarizes the poverty estimates for the reference years that have been affected by this revision, for urban and rural India, as well as nationally. For 2015, 9.5% (15.3%) of the population is poor in urban (rural) areas. These are slightly different from the estimates from Newhouse and Vyas (2018) (10.0% and 16.8%, respectively), since HFCE growth rates have been used to line up the estimates from 2014.5 to 2015.<sup>8</sup> The 2012-2014 reference year estimates change as well, because the growth rate from 2011.5 to 2012, 2013 and 2014 have been revised with the pass-through factors mentioned above. The estimates published in April 2018 assumed a higher growth in HFCE (a pass-through factor of 100%); assuming now a lower growth rate implies higher poverty rates.

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<sup>6</sup> Earlier projections had used a pass-through of 57% (for both urban and rural areas) which is based on the observed historical relationship between the survey and national accounts growth rates (Jolliffe et al., 2015, chapter 1, footnote 14; Ravallion, 2003).

<sup>7</sup> This is the exact formula used:  $\mu_{refyear} = \mu_{2011.5} + \frac{HFCE_{refyear} - HFCE_{2011.5}}{HFCE_{2014.5} - HFCE_{2011.5}} * (\mu_{2014.5} - \mu_{2011.5})$ , where  $\mu$  refers to the survey mean, and *refyear* refers to the reference year in question, here 2012, 2013 or 2014. The HFCE data have been updated to the June 2018 vintage of the WDI.

<sup>8</sup> A passthrough rate has also been applied to the growth in HFCE from 2014.5 to 2015. Since  $HFCE_{2014.5}$  is constructed as the average of  $HFCE_{2014}$  and  $HFCE_{2015}$ , and since  $HFCE_{2014}$  and  $HFCE_{2014.5}$  are determined using the method above,  $HFCE_{2015}$  is determined as the residual:  $HFCE_{2015} = 2 * HFCE_{2014.5} - HFCE_{2014}$ . This implies a passthrough rate from 2014.5 to 2015 of 76.3% for rural India and 59.8% for urban India.

The 2010 and 2011 reference year estimates also change. These estimates are based on an interpolation of the 2009.5 and 2011.5 surveys (see Data Appendix of World Bank (2018) for details). While the 2011.5 survey-year estimate is unchanged, the growth rate between 2011 and 2012, and hence also the growth between 2011 and 2011.5 is revised. This causes small changes to these earlier reference year estimates.<sup>9</sup>

**Table 5.** Changes in India reference year estimates: Comparison of poverty rates (in %, at \$1.90)

Year	Urban		Rural		National	
	Apr 2018	Sep 2018	Apr 2018	Sep 2018	Apr 2018	Sep 2018
2010	17.9	17.8	32.5	32.4	28.0	27.9
2011	14.3	14.0	26.1	25.7	22.4	22.0
2012	12.8	13.0	23.2	23.6	19.9	20.3
2013	10.4	11.7	19.3	20.6	16.5	17.8
2015		9.5		15.3		13.4

Source: [PovcalNet](#)

<sup>9</sup> The  $HFCE_{2011}$  has been revised for the same reason mentioned in the previous footnote (it is determined as the residual of  $HFCE_{2011.5}$  and  $HFCE_{2012}$ ). Since the growth between 2011.5 and 2012 is revised downwards, the growth between 2011 and 2011.5 is also revised downwards. This lower growth rate implies that the 2011 survey mean based on extrapolating the 2011.5 vector backwards is higher ( $\mu_{2011} = \mu_{2011.5} * \frac{HFCE_{2011}}{HFCE_{2011.5}}$ ), and consequently that poverty is lower. This also applies to the 2010 reference year estimate, since the 2011.5 survey is still used there.

## 7. Country-years added

24 new country-years have been added to PovcalNet. These surveys are listed in Table 6.

**Table 6.** New country-years added

<b>Economy</b>	<b>Years</b>	<b>Survey name</b>
Bhutan	2017	BLSS: Living Standards Survey
China	2015	China National Integrated Household Survey
Gabon	2017	EGEP: Enquête Gabonaise pour l'Evaluation et le Suivi de la Pauvreté
Indonesia	2017	SUSENAS: National Socio-Economic Survey
Ireland	2015	EU-SILC
Italy	2015	EU-SILC
Kenya	2015.67	IHBS: Integrated Household Budget Survey
Kosovo	2016	HBS: Household Budget Survey
Luxembourg	2015	EU-SILC
Macedonia	2009	EU-SILC
Malaysia	2011, 2013, 2015.33	HIS: Household Income Survey
Malta	2015	EU-SILC
Morocco	2013.5	ENCDM: Enquete Nationale sur la Consommation et les Dépense des Ménages
Namibia	2015.27	NHIES: Namibia Household Income and Expenditure Survey
Pakistan	2015.5	PSLM: Pakistan Social and Living Standards Measurement Survey
Poland	2016	HBS: Household Budget Survey
Switzerland	2015	EU-SILC
Thailand	2014, 2015	SES: Household Socio-Economic Survey
Uganda	2016.5	UNHS: Uganda National Household Survey
Vietnam	2016	VHLSS: Vietnam Household Living Standards Survey
West Bank and Gaza	2016.75	PECS: Palestinian Expenditure and Consumption Survey

## 8. Estimating shared prosperity in China

The World Bank's poverty estimates for China are based on tabulated data provided by China's National Bureau of Statistics. For example, the 2015 estimate is based on 20 points on the urban and rural Lorenz curves. To estimate urban and rural poverty rates, and other distributional statistics, PovcalNet fits parametric Lorenz curves to these grouped data (see the PovcalNet website and the background papers for further details). In addition, PovcalNet makes an adjustment

for spatial price differences between urban and rural China, and uses the urban and rural populations from the WDI.

PovcalNet reports distributional statistics, including the average consumption of the bottom 40 percent, separately for urban and rural China. However, the World Bank's Shared Prosperity measure (the growth in average income or consumption of the poorest 40 percent) is defined *nationally*. Shared Prosperity can be obtained from PovcalNet by using the national poverty gap with the appropriate poverty line.

For China, PovcalNet reports the national poverty headcount, as well as the poverty gap, for any poverty line. By rearranging the formula for the poverty gap, it can be shown that the mean consumption of the poor is given by

$$\bar{y}^P = z \times \left(1 - \frac{PG}{HC}\right)$$

where  $z$  is the poverty line,  $PG$  the poverty gap, and  $HC$  the poverty headcount ratio. Therefore, the mean consumption of the bottom 40 percent can be found by setting  $z$  such that the (national) headcount  $HC = 0.4$ . In other words,  $z = Q_{40}$ , the national 40<sup>th</sup> percentile. In practice, this involves iterating over poverty lines in PovcalNet until the national  $HC = 0.4$ .

The national 40<sup>th</sup> percentiles are \$5.873 and \$6.935 (per capita, per day) in 2013 and 2015, respectively. Hence, the mean of the bottom 40 percent is \$3.908 and \$4.653 in 2013 and 2015, respectively. This implies an annual growth rate in the mean of the bottom 40 percent of 9.11% over this period, which is the Shared Prosperity estimate reported in Chapter 2 of World Bank (2018). As noted above, these results are approximate (e.g. based on 20 points for the urban and rural distributions) and may therefore differ from calculations that use the underlying micro data directly.

## 9. Other changes

The country name for Swaziland was changed to Eswatini.

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