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The Future of Worldwide Income Distribution

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Abstract

Combining consensus forecasts of growth of population and real incomes during 2014–35 with household income surveys for more than a hundred countries accounting for the bulk of the world economy, we project the income distribution in 2035 across all individuals in the world. We find that the Gini coefficient of global inequality declined from 69 in 2003 to 65 in 2013, and we project that it will decline further to 61 in 2035, largely owing to rapid economic growth in the emerging-market economies. We project major increases in the potential pool of consumers worldwide, with the largest net gains in the developing and emerging-market economies. The number of people earning between US$1,144 and US$3,252 per year in 2013 prices in purchasing power parity (PPP) terms will increase by around 500 million, with the largest gains in Sub-Saharan Africa and India; those earning between US$3,252 and US$8,874 per year in 2013 prices will increase by almost 1 billion, with the largest gains in India and Sub-Saharan Africa; and those earning more than US$8,874 per year will increase by 1.2 billion, with the largest gains in China and the advanced economies. Using household survey data, we begin to trace the implications of these results for consumption patterns by documenting a positive, convex relationship between per capita consumption and the share of transportation in total consumption, which suggests a more rapid rise in transportation consumption than based on projected GDP growth.

JEL Codes: D12, D31, O47

Keywords: Consumption, Food, Transportation, Global Income Distribution, Growth, Population.

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I. INTRODUCTION

Over the next two decades the structure of world population and income will undergo profound changes. For example, economic growth in the emerging-market economies, including China and India—the most populous countries in the world—is projected well above growth in the advanced economies. A demographic explosion is already beginning in Africa, where strong economic growth is also projected. Such changes will transform the global distribution of incomes and with it the patterns of consumption, in terms of goods and services demanded[1] and the location of consumers.

Public discourse on inequality has recently focused on the fabulous riches accruing to those at the very top and has sought to relate them, on the one hand, to benefits for technological and business innovation and, on the other hand, to challenges with respect to equity or even potential distortions to democratic representation. While those issues are important, one should not lose sight of the fact that many global issues and challenges are influenced by the whole distribution of income globally. With rising incomes in developing and emerging-market economies, hundreds of millions of people will be lifted from abject poverty to "working poor" levels where they can afford a more adequate and varied diet and basic consumer goods, and additional hundreds of millions will move from modest consumption levels to a degree of affluence currently associated with advanced economies. The ability to participate in and benefit from economic growth has immediate and tangible impacts on the lives of the bulk of the world's population.

Beyond improvement in welfare, increases in consumption and changes in its composition will present opportunities for companies and investors. But they will also pose policy challenges, including those related to pressures on scarce natural resources and climate change. Potential applications include demand for various categories of goods and services (e.g., basic consumer goods vs. luxuries; food vs. transportation; meat, fish, water), "bads" (e.g., smoking, sugary drinks), and infrastructure (e.g., roads, airports, energy plants).

This study combines existing projections of population and output growth with the highest-quality information available about within-country income distributions (drawn from household surveys in a large number of countries, accounting for the near entirety of world income and population). We use these data to project the number of individuals in various income brackets (e.g., between US$10,000 and US$11,000 in today's prices) in 2035 on the assumption that within-country income inequality remains at the level observed in the surveys of the late 2000s. This makes it possible to compare the worldwide

1. For example, individuals' share of food in total consumption declines as their per capita incomes rise ("Engel's law"), whereas the share of transportation in total consumption rises with per capita incomes, as documented using household-level data for 92 countries in the World Bank's Global Consumption Database (http://datatopics.worldbank.org/consumption/). Evidence is presented in section VI.

distribution of income two decades from now with the current situation and to calculate changes in global inequality that will result from different growth rates in population and GDP in different countries. Moreover, as the composition of consumption baskets depends on incomes, projections of the number of individuals in each income bracket will facilitate a better-informed analysis of the levels of consumption of various goods and services in the future,[2] their distribution across the globe, and associated policy challenges.

Our analysis builds on the work of Branko Milanović (2002, 2005) and Xavier Sala-i-Martín (2006), who estimated past developments in worldwide income distribution, but shifts the focus to projections over the next two decades.

Our key results include the following:

- Global income inequality started declining significantly at the turn of the century, and we project that this trend will continue for the next two decades, under what we consider the profession's "consensus" projections for the growth rates of output and population.
- At a general level, future global growth is compatible with a further reduction in global income inequality, provided that inequality within countries does not rise at unprecedented rates.
- Specifically, in the baseline projections, the Gini coefficient for worldwide income distribution is expected to decline from 65 in 2013 to 61 in 2035. By comparison, it was 69 in 2003 and at similar values in the late 1980s. While individual income at the 90th percentile in the global distribution was 31 times that at the 10th percentile in 2013, this ratio is projected to fall to 24 in 2035. The projected improvement stems primarily from faster economic growth in the developing and emerging-market economies than in the advanced economies.
- Under an alternative "reversion to mean" scenario in which countries' economic growth rates are projected to revert gradually toward the worldwide sample mean, inequality declines more slowly, to a Gini coefficient of 64 in 2035.
- Under an "optimistic scenario" for India and China in which both economies maintain rapid growth (assumed at 7 percent annually) for the next two decades through sound economic policies and reforms, the global Gini coefficient would fall to 63 in 2035 but with opposing contributions from these two large countries: Indian growth above the world average would continue to reduce global

2. To see how information on income distribution is relevant to consumption, consider two countries with the same average per capita income but at polar extremes of income distribution: one in which most income goes to a spectacularly rich ruler and little to his impoverished subjects, and another in which income is equally distributed. In the first case, the country's economic growth will be mostly reflected in rising consumption of luxury items; in the second, growth will lead to widely shared gains in the consumption of basic consumer goods and, say, transportation. Beyond the differing implications for the share of consumption of luxury and basic consumption goods and transportation services, the increase in pressures on the environment or on physical infrastructure may—perhaps paradoxically—be greater in the second case than in the first.

inequality because India is still relatively poor by global standards; in contrast, Chinese growth above the world average, while beneficial in terms of overall welfare, would increase global inequality because the majority of Chinese citizens already had incomes higher than the global median in 2013 in purchasing power parity (PPP) terms.

- Under the baseline scenario, we project major increases in the potential pool of consumers worldwide, with the largest net gains in the developing and emerging-market economies. For example, using income groups based on thresholds selected by the World Bank in its Global Consumption Database (GCD), the number of people earning between US$1,144 and US$3,252 per year in 2013 prices in PPP terms will increase by around 500 million, with the largest gains in Sub-Saharan Africa and India; the number of people earning between US$3,252 and US$8,874 per year in 2013 prices will increase by almost 1 billion, with the largest gains in India and Sub-Saharan Africa; and the number of people earning more than US$8,874 per year will increase by 1.2 billion, with the largest gains in China and the advanced economies.[3]

To give a preview of our ongoing work on the implications of these projections for consumption patterns and related policy challenges, we report early results showing a convex relationship between the share of spending on vehicles and total consumption per capita, based on household information for 161 countries and subnational regions.

II. METHODOLOGY

Our approach presents two main advantages compared with previous studies. First, we use high-quality microeconomic data on within-country income distributions from the Luxembourg Income Study; these data have only recently become available for the majority of the world's population. Second, we project the number of people in narrowly specified income brackets, making it easier to analyze the implications for specific consumption items.[4]

Using data on income or consumption by individual households—instead of treating all residents in a given country as though they each had GDP per capita equal to the national average—is important for

3. The thresholds selected by the World Bank for the GCD were originally set for 2010 US dollar amounts in PPP terms. We adjusted them by US CPI inflation over 2010–13 to retain the same real value. The thresholds were originally selected to be the bottom 50 percent, the 51st–75th percentiles, the 76th–90th percentiles, and the top decile of the global distribution in 2010 using household surveys for 92 countries. Although these thresholds and the groups they identify could be viewed as somewhat arbitrary, we chose them for consistency with the consumption data, which are published on the GCD website for those groups.

4. Previous studies have sought to project the number of individuals worldwide and in various regions that will enter the "middle class" (by different definitions, depending on each study). For example, Kharas (2010) projected the growth of the middle class—defined by Bhalla (2002) as individuals earning between US$10 and US$100 per day in 2005 constant prices at purchasing power parity—during the next few decades.

two reasons. First, it provides a more accurate picture of worldwide income distribution and of the change in inequality over time. Second, forecasting worldwide or countrywide consumption of a given good or category of goods on the basis of average per capita GDP or average per capita total consumption would be accurate only under the assumption of linear Engel curves—that is, a linear relationship between the share of total consumption devoted to the good or spending category in question and the logarithm of total consumption (Lewbel 2006). Although Engel curves are often approximately linear for food consumption, they are not for several other consumption items or categories (Banks, Blundell and Lewbel 1997).

As our objective is to draw the implications of existing data and projections for the future of income distribution, the inputs for our analysis are drawn from standard international sources. Data for total and per capita GDP in 2013, expressed in PPP terms (2011 international US dollars), are from the World Bank.[5] Population growth projections, whose past forecasting record is discussed in a later section, are drawn from the United Nations.[6]

Projections of Economic Growth, 2013–35

Projections for economic growth are compiled, for the most part, from existing sources; they are generated by the authors only for a few countries that together account for a small share of the world's output and population. The use of existing projections by reputable forecasters as close as possible to the consensus in the economics profession is a strength of this exercise, enabling us to focus on tracing the implications of such projections for the issues of interest.

GDP growth projections used in this study are from November 2014. They refer to the period 2013–35, are expressed in real per capita terms, and are drawn from the following sources (table 1 summarizes, with further detail provided in appendix C):

- The source of the bulk of data on the world economy and population is the Organization for Economic Cooperation and Development (OECD) "Looking to 2060" website (www.oecd.org/eco/outlook/lookingto2060.htm). These projections are model-based and consistent with those published in the OECD's *Economic Outlook*; the methodology is outlined by Åsa Johansson and colleagues (2013). Country coverage is for most advanced economies and a few large emerging-market economies.

5. *World Development Indicators* database, http://data.worldbank.org/indicator/all (accessed in November 2014).

6. Projections drawn from http://esa.un.org/unpd/wpp/Excel-Data/population.htm (accessed in early November 2014). This corresponds to the data from United Nations, Department of Economic and Social Affairs, Population Division (2013). World Population Prospects: The 2012 Revision, DVD Edition. Specifically, the medium fertility assumptions were used as the baseline.

- When OECD projections are not available, the next source is Consensus Forecasts (available at www.consensuseconomics.com), which post averages of projections from various professional forecasters (e.g., Standard & Poor's, Credit Suisse, Moody's Analytics), each using its own methodology. Consensus Forecasts are available only through 2023 or so. We extend these projections by assuming that growth in each subsequent year through 2035 is the same as in the last year for which projections are available. The rationale for this approach is that most forecasters assume that the output gap is closed by the end of their projection period, and thus the growth rate in the final projection year constitutes their best estimate of the country's potential growth rate. A source of approximation in this approach is that we do not incorporate demographic developments that the forecasters might have considered for the second decade in the forecasting horizon. By using this source, we are able to extend coverage to several emerging-market economies, especially in Eastern Europe, Asia, and Latin America.
- For low-income (IDA-eligible) countries (none of which are covered by the OECD or Consensus Forecasts), the main source is the most recent compilation of long-run economic growth projections in the debt sustainability analyses prepared and published by International Monetary Fund (IMF)/World Bank teams.

For countries for which projections are not available from any of the foregoing sources, we construct them based on the following equation:

$$g_{2014–35} = \alpha + \beta g_{1993–2013}$$

where $\alpha = 0.84$ and $\beta = 0.35$. These coefficients were estimated through panel regressions applied to Penn World Tables data on real per capita GDP for 188 countries over 1950–2010 (subject to availability; details on the estimation are reported in Ho and Mauro 2014). In other words, economic growth over the next two decades is projected on the basis of a simple autoregressive process (as in Pritchett and Summers 2014). In the case of the few countries for which data were not available over the past two decades, or where the 1990s/early 2000s were dominated by major wars, a similar autoregressive approach was used, based on data for 2004–13.

Initial Global Inequality

Consistent with our interest in measuring the income and consumption patterns of individuals—reflecting differences both within and between countries—we focus on the global interpersonal distribution of income, or "global inequality." In the absence of a global survey of incomes, estimates of global inequality have to combine data from national surveys. We rely primarily on high-quality, internationally comparable survey data that have recently become available for many countries through the Luxembourg

Income Study (LIS). These data cover countries accounting for 63 percent of the world population and 80 percent of world GDP in 2013. The availability of individual-level data and flexible access to the LIS make it possible for us to extract data for specific income brackets or quantiles suited to our research questions. We use the most recent LIS data available: 2010 for most countries and the early to mid-2000s for the remainder (see appendix C). For countries for which LIS data are not available, we use data from the World Bank—specifically, where available, the PovcalNet database (http://iresearch.worldbank.org/PovcalNet/), which compiles household surveys mostly from developing countries and is used to estimate global poverty. For the few remaining countries, we use the World Income Inequality Database (WIID; www.wider.unu.edu/research/Database/).

Previous studies on global inequality (e.g., Milanović 2005, Lakner and Milanović 2013) primarily used World Bank data. Unfortunately, the within-country inequality measures in these datasets are not calculated on the same basis across countries, making them less comparable than the LIS data (Anand and Segal 2008). We have also verified that our results are essentially the same if we replace the unadjusted World Bank data with data reported by Frederick Solt (2014), who has sought to standardize the World Bank data by using multiple imputation techniques.[7]

Because the World Bank data are available only in the form of summary statistics, rather than individual-level microdata, researchers need to make choices about which statistics to use. Some studies used mean incomes by decile in each country to estimate global inequality (e.g., Milanović 2005, Lakner and Milanović 2013). We opted instead to approximate a continuous income distribution for each country using the Gini coefficient and mean income from the surveys and assuming lognormality of the distribution of incomes. In view of our interest in a regional breakdown of the worldwide income distribution, not just an estimate of the global Gini coefficient, a continuous distribution is preferable to decile averages, particularly for populous countries.[8]

To convert the latest available within-country income distributions to 2013 estimates, all incomes in the distribution for a given country are increased by the rate of growth of aggregate household final consumption expenditure between the survey year and 2013.[9] The income data, expressed in national currency at current prices, are then converted to a common numeraire using the World Bank PPP

7. See Jenkins (2014) for a comparison of the unadjusted and standardized World Bank datasets.

8. For example, a decile of the Indonesian population consisted of around 25 million people in 2013; assigning all of them identical income will over- or understate the share of East Asia in particular income brackets. In particular, using this method the top decile of the worldwide distribution would be composed exclusively of people living in the advanced economies because mean income in the top decile in the within-country distributions of the vast majority of emerging economies falls well short of the 90th percentile of the global income distribution.

9. In the absence of data on the real growth rate of household incomes, data on the growth of household consumption from national accounts is the best proxy available for the countries in our sample.

conversion factors for 2013 from the 2011 International Comparison Program. By using PPP exchange rates, global interpersonal income comparisons reflect more accurately relative purchasing power across countries.[10]

Assumption Regarding the Path of Inequality in Individual Countries

In projecting income distribution patterns around the world over the next two decades, we made a key assumption in the baseline projections that income distribution will not change within each country, although in reality within-country inequality will most probably increase in some countries and fall in others. Our assumption of no change is a simplifying assumption driven by the fact that the distribution of income is affected by a multitude of factors that vary across countries and over time, making it very difficult to make even an informed guess about the likely future path of within-country inequality over a 20-year period for every country.

There is strong evidence to suggest that economic growth has no systematic effect on the distribution of incomes one way or the other. For example, in a global dataset of 118 countries over the past four decades, changes in the share of income accruing to the bottom two quintiles in individual countries are generally small and uncorrelated with changes in average income (Dollar, Kleineberg, and Kraay 2013). More generally, in a similar panel of countries, changes in social welfare—measured by various combinations of overall income and inequality measures—are primarily determined by changes in overall income, with changes in inequality playing a relatively minor role (Dollar, Kleineberg, and Kraay 2014).

Although studies based on tax return data (notably, Atkinson, Piketty, and Saez 2011) have found an increased share of income accruing to the top percentile of the population in some large advanced economies, comprehensive analysis of available household survey data for a broader range of countries reveals a more mixed picture of inequality trends. Looking at changes since 1995 (101 countries) and since 2000 (113 countries), based on a combination of LIS and PovcalNet data, about half of the countries in the sample experienced a fall in the Gini index greater than one Gini point (on a 0–100 scale), about a third experienced a rise of more than one Gini point, and the remainder experienced little or no change.

Because these observations are based on different data sources (tax returns versus household surveys) and different portions of the distribution (top percentile versus whole distribution), they are not mutually inconsistent. As noted below, household surveys tend to underrepresent the very richest households and

10. Nontraded goods and services, an important component of consumption baskets, tend to be cheaper in emerging and developing countries than in advanced economies and market exchange rates understate this price difference. PPP exchange rates adjust for the difference.

so may not fully capture the rising share of income going to the very top. At the same time, these surveys indicate that changes in the distribution below the very top are mixed across countries.

As with economic growth, it is not straightforward to identify empirical associations between other possible underlying factors and changes in income distribution. One could well conjecture that increases in the share of income accruing to the more affluent may stem from technological factors and globalization, whereas improvements accruing to the lowest deciles may be associated with redistributive public policies. But such associations are not easily found in panels of countries. Forecasting changes in such underlying factors over a 20-year period would be even more challenging.

Simple extrapolation of recent inequality trends 20 years into the future seems to us inappropriate for two reasons. First, the World Bank data on inequality are not always calculated on a consistent basis over time, making the estimation of trends for developing countries problematic; several countries have insufficient data to calculate a trend with any degree of confidence. Second, even for countries with good-quality LIS data, the trend over the past few decades has not been steady. Many countries saw a significant increase in inequality in the 1980s and 1990s and a more limited rise or even decline (e.g., in eurozone periphery countries) in the 2000s. The choice of time frame over which the trend is calculated is therefore significant, and a responsible choice would need to be informed by judgments about the causes of past changes and their continued relevance that are difficult to make.

For these reasons an unchanged income distribution over the next two decades is a practical working assumption. We also explore the extent to which within-country inequality would have to increase for our baseline projection of declining global inequality to be overturned.

Reliability of Long-Run Projections of Economic Growth and Population

Prediction is very difficult, especially if it's about the future, as physicist Niels Bohr famously remarked. Nevertheless, decisions by policymakers, investors, and business executives are necessarily based—whether explicitly or implicitly—on views regarding the future path of incomes. Yet the economics profession's ability to forecast GDP growth accurately beyond the next year or so is limited.

Adding to the obvious uncertainty surrounding long-run projections, previous studies have documented systematic statistical biases. For example, current forecasts at the 10- or 20-year horizon seem to be more optimistic than warranted by past international evidence, and the average ex post gap between actual and forecast growth has turned out to be more negative the longer the projection horizon (Ho and Mauro 2014). We therefore analyze an alternative, "downside" scenario in a later section. Such a scenario can be viewed as measuring the costs of deviating from the policies needed to maintain strong growth consistent with existing forecasts. Another approach is to trace the consequences of possible overoptimism embedded in the "consensus" forecasts of economic growth underlying our baseline scenario.

The forecasting record is better for projections of population growth. Demographic developments are smoother than economic developments, and population growth is determined with long leads in the data. Ex post assessments of the forecasting record of the relevant section of the United Nations—the most widely respected forecasting agency in this domain—have found it to be reasonably accurate. Errors in population projections for the world as a whole have been limited (1–7 percent in various long-run projections), though errors in projections of population for individual countries have often been substantially larger.

Considering the projections made in 1980 for the year 2000 (a germane comparison, given that our analysis will focus on the next two decades), the unweighted mean across countries of the ex post absolute errors for individual country projections was slightly above 10 percent (cumulative over the entire period), and the average bias was a positive 2 percent (Bongaarts and Bulatao 2000). Errors were larger for smaller countries. They were also concentrated in the projections of the very young and very old. Finally, the errors have become smaller over time, presumably reflecting improvements in the quality of data inputs and forecasting techniques.

This said, we checked whether our results on developments in global inequality are robust to alternative population growth scenarios. The differences between the high and low fertility scenarios calculated by the United Nations for 2035 are insufficient to have a material impact on our baseline, so we do not discuss those results in detail.

Key Underlying Trends

Building on the assumptions outlined in the previous sections, we posit that developments in worldwide income distribution are driven by the growth of population and output across the world as well as by interaction with initial income distribution patterns. This section provides an overview of these two important driving forces, to enhance understanding of how they will shape the future of worldwide income distribution.

Population Growth

Most of the estimated growth in population worldwide—from 7.0 billion in 2013 to 8.6 billion in 2035—is projected to occur in the developing and emerging economies (figure 1). Sub-Saharan Africa will see the largest increase, from 0.9 billion to nearly 1.6 billion, with sizable gains also in India as well as other parts of South and East Asia, Central and South America, and the Middle East and North Africa. In contrast, population growth will be limited in China and approximately nil in Eastern Europe and Central Asia. During the next two decades, population is projected to rise slowly in the advanced economies, with net gains essentially only in the United States, Australia, and Canada.

Growth of Per Capita and Total Incomes

Average per capita GDP growth in 2013–35 is projected to be higher for the developing and emerging economies (3.8 percent annually)—not only China and India (4.4 and 4.8 percent, respectively) but also Sub-Saharan Africa (3.5 percent)—than for the advanced economies (1.8 percent). Considering total GDP, Sub-Saharan Africa and India are projected to experience the highest growth rates (6.0 percent and 5.7 percent, respectively), combining rapid growth in both population and per capita incomes (figure 2). Although China's growth is projected to remain among the fastest in per capita terms, it will no longer be the most rapid in overall GDP terms, owing to a relatively low population growth rate.

III. BASELINE RESULTS

Worldwide GDP and Population in 2035

Before turning to the distribution of incomes worldwide, it is worth reporting some overall statistics for 2013 and the implications of individual-country projections reported in the previous section for worldwide GDP and population in 2035.

In 2013 total GDP for a nearly universal sample of 186 countries amounted to US$98.5 trillion (here and throughout, unless otherwise indicated, dollar amounts are expressed in US dollars at 2011 international prices, that is, in constant prices at PPP estimated in 2011). Total population for the sample was estimated at 7.02 billion inhabitants in 2013. These two statistics together yield an average per capita GDP worldwide of about US$14,000 in 2013.

Looking to 2035, the projected GDP for all countries in the sample yields a total GDP of US$210.0 trillion, equivalent to an average worldwide GDP growth rate of 3.5 percent a year over the next two decades. UN population projections (based on medium-fertility assumptions) indicate 8.56 billion inhabitants in 2035, a cumulative 21.9 percent increase worldwide, or 0.9 percent a year on average. Per capita GDP worldwide would thus be about US$24,500 in 2035 and average real per capita growth would be 2.6 percent per year during the 20-year period.

The allocation of worldwide output by group of countries and region will also change considerably (figure 3). The projections imply that the share of developing and emerging economies in total worldwide real output would rise from 56.2 percent in 2013 to 66.7 percent in 2035. The largest economies under this baseline scenario by 2035 will be China (20.6 percent of total world GDP), the United States (13.5 percent), the European Union (12.7 percent), and India (10.6 percent). Figure 4 shows gains in trillions of US dollars in real terms for each region over the same period.

The results reported above are for the whole sample of 186 countries for which population and GDP growth projections are available. Considering the subsample of 141 countries for which inequality data are available and thus the core of our analysis, the overall results in terms of total GDP and population

growth are fairly similar. Indeed, the countries for which inequality data are not available are relatively small in terms of both population and total output; the average rates of growth of total GDP, per capita GDP, and population for the 141 countries are almost identical to those in the larger sample.

Worldwide Distribution of Per Capita Incomes

The projected worldwide distribution of household incomes in 2035 is shown in figure 5, alongside the distributions for 2003 and 2013 (the latest year for which data were available at the time of writing). The frequency plot represents the share of the world's population corresponding to each annual per capita income bracket (at US$20 intervals, again in international US dollars in 2011 prices). The usual skewness of income distribution is apparent, with a large share of the world's population earning relatively meagre incomes and an extended right-hand side tail earning much higher-than-average incomes.

The median per capita income in 2013 was US$2,010 (up from US$1,090 in 2003) and the mean was US$5,400 (up from less than US$3,500 in 2003). As is well known from previous studies on global poverty or global income distribution (e.g., Bhalla 2002; Chen and Ravallion 2010; Cline 2004; Deaton 2005; Milanović 2005; Pinkovskiy and Sala-i-Martín 2010), the gap between mean income from household surveys and GDP per capita is large and stems from a variety of not fully understood factors. We follow Shaohua Chen and Martin Ravallion (2010) and Milanović (2005) in using the mean incomes from household surveys, because we believe this measure leads to a more reasonable distribution of incomes below the very top. In appendix A we summarize the advantages and disadvantages of each measure and explain the rationale for our choice in greater detail.

To put these estimates of the mean and median global incomes in context, the US poverty line in 2013 for a four-person family with two dependent children was about US$23,600 at current prices,[11] or about US$5,900 for a person living in such a household. Our estimates suggest that three quarters of the world's population had incomes below the official US poverty line in 2013.[12] Nevertheless, most

11. The official US poverty line is defined by the US Census Bureau (www.census.gov/hhes/www/poverty/data/threshld/index.html). The same threshold in 2011 prices rounded to $23,600, consistent with low inflation during 2011–13.

12. This may be a slight overestimate for two reasons. First, the US poverty line increases less than proportionately with family size because of economies of scale in living costs and it increases less when a child is added to the household than when an adult is added. Low incomes encourage people to live in larger households and fertility is higher in poorer countries, so a lower per capita poverty threshold would probably be appropriate for many developing-country residents. Second, although cross-country differences in the cost of living are taken into account through the use of PPP exchange rates, these do not capture price differences between urban and rural areas within countries. If the prices on which PPP conversion factors are based are sampled disproportionately from urban areas in developing countries (Chen and Ravallion 2010), this will bias upward the country's average price level and depress the incomes of the rural populations when expressed in PPP terms. We decided not to follow Lakner and Milanović (2013) in attempting to adjust for this factor, because the forward-looking nature of our exercise would require us to forecast the rate of urbanization and the respective growth rates of the urban and rural economies. Moreover, their analysis suggests that the effect of such adjustment on estimates of global inequality is not large.

developing economies also have significant shares of middle-class and rich individuals, as will be shown below.

Taking the global distribution of income as a whole, the Gini coefficient was 64.9 in 2013, down from 68.7 in 2003. By way of comparison, this is well above the Gini coefficient for the vast majority of within-country distributions (figure 6, top panel). The Gini coefficient in the United States, whose distribution is relatively unequal by the standards of advanced economies, was 40.5 in 2013, up significantly since the 1970s when it was about 35. Even Brazil, an emerging economy with relatively high (though falling) inequality, had a Gini coefficient of 49.3 in 2011. The only country in the LIS dataset with a higher Gini coefficient than the world as a whole was South Africa (66.6 in 2010), a society whose income distribution is still influenced by the legacy of inequities under apartheid.

An alternative inequality measure is the 90:10 ratio, which measures the ratio of the income of those in the 90th percentile of the distribution to that of the 10th percentile. The bottom panel of figure 6 shows that for most advanced economies this ratio is below 5, meaning that the income of people in the 90th percentile is less than 5 times that of people in the 10th percentile. For the United States this ratio was 6.6 in 2013. For the world as a whole our estimates suggest a ratio of 31 in 2013.

As shown in figure 5, the worldwide median individual income is projected to double, to US$4,000 in 2035, expressed in 2011 US international dollars, and average individual income is projected at about US$9,100. The Gini coefficient is projected to decline to 61.3 and the 90:10 ratio to 24 (figure 6). Thus, the worldwide distribution of income would become less unequal, although it would remain well above the inequality level seen in most countries. The main driving force underlying the shift toward greater equality worldwide during the next two decades is rapid growth in the developing and emerging market economies compared with the advanced economies.

To gain further insight into how variation in the Gini coefficient relates to variation in the 90:10 ratio, figure 7 displays the relationship between these two indicators for the countries in the LIS sample.

Our projections indicate that economic growth will continue to pull millions of people out of absolute poverty. Using the World Bank's poverty threshold of per capita income below $1.25 a day in 2005 prices ($1.46 per day in 2011 prices), our analysis suggests that the number of people in poverty will fall from about 850 million (12.3 percent of the total population in our sample) in 2013 to about 300 million (3.6 percent of the projected population in our sample) in 2035. Hundreds of millions of people in developing and emerging market economies will move into income categories considered "middle class" by advanced-economy standards. Nevertheless, more than half of the world's population in 2035 will still be below the US poverty level as defined today.

To provide some historical context for the 2013 estimate and 2035 projection, we estimated the global distribution of income for the years 2003 and 2008. Figure 8 shows the time series of our estimates

(in red) against the estimates of Lakner and Milanović (2013; blue) updated with new PPP estimates from the 2011 International Comparison Program (ICP).[13] Our estimates for 2003 and 2008 align closely with those of Lakner and Milanović, suggesting that our estimate for 2013 and projection for 2035 may be consistent with their estimates for previous decades. The results point to a continued decline in global inequality that started at the turn of the century, whereas global inequality was broadly stable between 1988 and the end of the 20th century.

IV. ALTERNATIVE SCENARIOS FOR GLOBAL INEQUALITY AND METHODOLOGICAL NOTE

Before reporting our baseline findings in greater depth, we conduct two exercises to explore the extent to which our results differ when we adopt alternative assumptions. First, because of the important role played by rapid economic growth in the emerging and developing economies in reducing global inequality, we ask how the results would differ if economic growth in those countries were lower than in our baseline. Second, to gauge the importance of our assumption of unchanged inequality within countries, we estimate the extent to which within-country inequality would need to rise, on average, for worldwide inequality to remain unchanged over the next two decades.

Alternative Scenarios for Economic Growth Projections

Some commentators have suggested that long-run economic growth forecasts are often overly optimistic—especially for emerging and developing economies that have grown rapidly over the past couple of decades, such as China and India (Pritchett and Summers 2014). Given the uncertainty surrounding such forecasts, we examine the implications of alternative assumptions.

1. Reversion to the Mean (RTM) Scenario

We choose an alternative scenario (based on projections constructed by Ho and Mauro 2014) using a simple autoregressive process:

$$g_{2014–35} = \alpha + \beta g_{1993–2013,}$$

where α and β were estimated through panel regressions applied to Penn World Tables data on real per capita GDP for 188 countries over 1950–2010 (subject to availability). Growth for 2014–35 is projected by applying the estimated α and β coefficients to a country's past growth (1993–2013). By allowing for some autocorrelation while projecting a gradual reversal toward the worldwide sample mean, this approach reduces the likelihood of overoptimistic projections stemming from excessive extrapolation of recent successes.

13. The results in Lakner and Milanović (2013) are based on the 2005 ICP round. The authors thank Branko Milanović for sharing his updated results.

It turns out that this alternative "reversion to mean" (RTM) method has only a small effect on the projections for China, reducing its average growth rate during the next two decades from 4.4 to 4.0 percent, because the OECD projections for China in our baseline scenario already assume a gradual but significant slowing of Chinese growth after 2015. For India the difference between the baseline and RTM scenario is much larger: the average growth rates under the two scenarios are 4.8 and 2.6 percent, respectively.

Overall the gap between baseline and RTM projections is larger, on average, for the developing and emerging economies than for the advanced economies, reflecting the relatively weak performance of the latter during the past two decades. Consequently, the downward adjustment of projected income growth is larger for individuals lower down the global distribution of incomes (figure 9). Appendix C reports the baseline and alternative scenario projections for each country in the sample.

Consistent with the larger downward revision in growth projections in the case of emerging and developing economies compared with advanced economies, a much lower reduction in global inequality is foreseen in the RTM scenario compared with the baseline scenario. The Gini coefficient is projected at 64.2 in 2035 under the RTM, compared with 61.3 in 2035 under the baseline scenario, down from 64.9 in 2013. With a smaller gap between the projected growth rates of emerging and developing economies versus the advanced economies, worldwide inequality would be reduced at a considerably slower pace. The number of people below the World Bank poverty threshold would decline to about 570 million (6.7 percent of the sample population) in 2035 under the RTM scenario, compared with 300 million (3.6 percent) under the baseline scenario. Similarly, the shifts into middle- and higher-income groups would be more muted under the RTM scenario.

2. Resilient Scenario for India, Indonesia, and Nigeria

We consider the possibility that some of the world's largest emerging markets maintain their baseline growth rate while the rest of the world follows the RTM scenario. The motivation is to determine the sensitivity of developments in global inequality to good economic policy and continued reform in these countries.

We assess the growth of three of the largest economies by population where the gap between the baseline and RTM scenarios is large—India, Indonesia, and Nigeria—at the baseline rate while all other countries follow the RTM scenario. Higher growth in these countries alone, and particularly in India, would have a significant effect on global inequality, reducing the global Gini coefficient from 64.9 in 2013 to 62.2 in 2035. Figure 9 (RTM ex. I,I,N) shows that this scenario implies significantly higher income growth between the 5th and 70th percentiles of the global income distribution than the RTM scenario.

3. Optimistic Scenario for China and India

As a further alternative we consider a scenario in which China and India grow at significantly higher rates than in the baseline scenario. Specifically, we assume that total income in India grows at an average annualized rate of 7 percent for 2014–35 and Chinese income grows at 7 percent for the first 10 years and at 6 percent thereafter.[14] These rates of GDP growth for these two countries are somewhat more optimistic but not very far from the Consensus Forecasts, which are significantly more optimistic than the OECD forecasts used in the baseline scenario.

It turns out that while rapid growth in India would significantly reduce global inequality, continued robust growth in China over the next two decades would increase it. With only India growing at the more rapid pace the global Gini coefficient would fall from 64.9 in 2013 to 62.2 in 2035. With rapid growth in both China and India the global Gini coefficient would fall less, to 62.7, because China's growth would be from a much higher initial median income than India's and, in fact, higher than the worldwide median in 2013. Combined with China's relatively high level of inequality, its growth would lead to a significant rise in the share of Chinese population that attained an advanced-economy standard of living and pulled away from the bulk of the world's population living on low and medium incomes. Figure 9 shows that under this scenario, incomes in the top half of the global distribution would grow as fast as in the baseline scenario while those in the bottom half would grow significantly more slowly.

Alternative Scenario for Within-Country Inequality

Our baseline projections assume unchanged income distributions in individual countries. We believe this is a reasonable assumption in view of the fact that some countries experienced increases and others decreases in inequality during the past two decades, with no robust empirical association between changes in inequality and other variables. Nevertheless, it is appropriate to explore whether within-country changes in inequality could overturn our baseline results. To what extent would within-country inequality need to rise to prevent worldwide inequality from declining during the next two decades? Assuming the increase in the within-country Gini coefficient (expressed in Gini points) were equal in all countries, a 6.3 Gini point increase would be required.[15,16]

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14. In per capita terms this implies an average annual growth rate of 6.2 percent in China and 6.0 percent in India in 2014–35.

15. To simplify this calculation we assume lognormal distribution of incomes for all countries in our sample, including those for which we have LIS microdata (the Gini indices and country means remain unchanged). The resulting impact on our estimate of global inequality is minor.

16. The reason the within-country Gini index needs to rise as much as 6.3 points to undo a fall in the global Gini that is much smaller in absolute terms (3.6 points) has to do with the complex relationship between global and within-country inequality. The global Gini index is a function of within-country inequality, between-country inequality (the relative means of each distribution), and the degree of overlap between the distributions of different countries. When within-country inequality rises so does the

For an individual country, this would not be unprecedented. For example, Indonesia, a country with a relatively low Gini coefficient at 29.3 in 1987, saw it rise by 6.3 Gini points to 35.6 in 2010. However, considering the 15 largest countries by population with sufficient data coverage over a roughly 20-year period, only two experienced an increase of more than 6 Gini points between the late 1980s/early 1990s (depending on data availability) and around 2010 (Indonesia and China), and two saw a decrease in the Gini coefficient of more than 6 points (Russia and Brazil); the remainder saw a slight prevalence of increases over decreases.

Focusing on the last decade only, however, increases and decreases were evenly distributed and generally small in magnitude. (The largest changes observed in the Gini coefficient were in countries for which LIS data are not available for earlier years and the observed changes may therefore stem in part from measurement error.) Thus, on the whole, it seems unlikely that developments in within-country inequality would offset the impact of cross-country differences in economic growth to an extent that would prevent improvement in worldwide inequality as projected in the baseline scenario.

Advantages of Using Household-Level Data

From the standpoint of projecting changes in worldwide inequality, the gains in accuracy from using household-level data rather than countrywide average per capita incomes are considerable. To get a sense of the magnitudes, it is worth reporting the estimated changes in the worldwide Gini coefficient between 2013 and 2035 using our preferred methodology and, for comparison, a method that ignores the within-country distribution of incomes and instead assumes all residents in a given country earn its average per capita income (obtained from the country's household survey). There is a large level effect, as one would expect given that the "no within-country information" method ignores an important source of income inequality—that which is measured within rather than between countries. As a consequence our preferred method gives significantly larger estimates of global inequality than a comparison of average per capita incomes across countries.

More interestingly, there is also a significant effect on the estimated change in global inequality. Under the baseline scenario, the "no within-country information" method leads to overestimating the projected decline in inequality. In contrast, under the alternative, RTM scenario for economic growth, the same method would lead one to project unchanged inequality, whereas under our preferred method inequality is still projected to decline, though less than in the baseline scenario (Table 2). The difference is not driven by any changes in within-country inequality because this is held constant between 2013 and 2035 by assumption. Rather, it is due to the degree of overlap between income distributions in different

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degree of overlap, offsetting some of the impact on the global Gini index. Therefore a larger increase in within-country inequality is needed to generate a given increase in global inequality.

countries, which changes as the individual distributions shift upward (due to rising incomes) at different rates. This overlap is ignored by analysis that considers only average per capita incomes.

V. FURTHER RESULTS FOR BASELINE SCENARIO

In this section we provide further detail on the projected global distribution of income in 2035, first by income decile and then by groups defined in terms of absolute income ranges.

Geographic Distribution of World Population by Income Decile

To summarize how different geographical regions participate in the evolution of worldwide income distribution, figures 10a and 10b illustrate, for each income decile in 2013 and 2035, respectively, the share of population for each region. For example, for the bottom decile of the worldwide income distribution in 2013, figure 10a shows that about 40 percent of that group was located in Sub-Saharan Africa, over 30 percent in India, 15 percent in China, and the remainder largely in East Asia and the Pacific and South Asia. About 80 percent of the top decile was located in the advanced economies, almost 10 percent in China, and the remainder largely in Eastern Europe and Central Asia, Latin America and the Caribbean, and East Asia and the Pacific. By 2035 the geographic distribution of world population in each income decile will have changed considerably (figure 10b). The bottom decile will be even more heavily concentrated in Sub-Saharan Africa, which will account for more than half of that group, owing to the region's starting point and its rapid population growth. In contrast, China and India will account for larger shares of the middle and top deciles; China in particular will account for almost 20 percent of the global population in the top decile. In contrast, the share of economies classified as advanced will fall from 80 percent to just over 60 percent in the top decile.

Worldwide Developments in Individual Incomes, by Income Bracket

Overall well-being and consumption patterns (by type of goods and services) are primarily determined by absolute, rather than relative, incomes. Thus, in the remainder of this study, we focus on absolute incomes (in US international dollars at constant prices) rather than income deciles as in the preceding section.

As average per capita income and global population increase, more and more people will find themselves in the higher income brackets, with larger bars on the right-hand side of figure 11 in 2035 than in 2013. The number of people in the lowest income bracket (the first bar) is projected to decline in absolute terms by almost 1.2 billion people: in other words, despite population growth and its concentration in Sub-Saharan Africa, fewer people will have very low incomes in 2035 than in 2013, as noted above. The number of people earning between US$1,144 and US$3,252 per year in PPP terms at 2013 prices will increase by around 500 million, with the largest gains in Sub-Saharan Africa and

India. This is the income bracket where most of the population growth in Sub-Saharan Africa will be concentrated over the next 20 years. The number of people earning between US$3,252 and US$8,874 per year will increase by almost 1 billion, with the largest gains in India and Sub-Saharan Africa but with large gains also in Southeast and South Asia (included in the data for the rest of the world, ROW). The number of people earning more than US$8,874 per year will increase by 1.2 billion, with the largest gains in China and the advanced economies (EU and OECD) but with significant gains also in India and in East Asia. A breakdown of each income bracket by region is shown in figure 12.

To the extent that consumption of certain goods is associated with particular income brackets, these developments will have major implications for consumption of each good at the worldwide level. For example, spending on cars (Chamon, Mauro, and Okawa 2008) and other transportation goods and services is associated with incomes above US$5,000 per year, so the shift in worldwide population above that threshold may be expected to result in greater pressures on public infrastructure and the environment, implying the need for policies to prepare for such changes. We plan to report on some of these issues in follow-up work, building on the income projections outlined here.

VI. IMPLICATIONS FOR CONSUMPTION PATTERNS: A FIRST LOOK AT THE DATA

To understand the potential implications of economic growth and changes in global income distribution in the years ahead, we report initial results of an analysis of the relationship between total consumption and consumption shares allocated to particular categories of goods. We focus on food and transportation (vehicles and other transportation), using summary information from household surveys published by the World Bank in its Global Consumption Database.

The data refer to 161 locations, including developing and emerging economies as well as subnational regions (shown in appendix D). For each location, the data refer to the averages for all households, split into four consumption segments—lowest, low, middle, and high—with the thresholds noted above. This approach yields 161*4 = 644 observations, but the sample is reduced to 614 because for 30 locations the "high" segment is essentially empty.

For each location and consumption segment, the share of expenditure devoted to a particular category of goods is computed. We focus on food and vehicles for two reasons. First, these are the largest shares in overall consumption for many countries. Second, the share of spending on food has been shown in previous studies (on different datasets) to decline linearly as the logarithm of total consumption (or income) increases. This is known as Engel's law and is one of the most robust relationships in economics. In contrast, other studies have found evidence that spending on cars displays a convex relationship with respect to total consumption.

We begin by analyzing regressions of the share of food (or vehicles) in total consumption against the logarithm of total consumption. As shown in table 3, the data display a tight, negative relationship between the share of food and total consumption, with an R^2 coefficient above 0.5 (column 1), and the null hypothesis of linearity is not rejected when adding a quadratic term (column 2). These results are consistent with similar findings by a host of other studies that used different datasets.

Looking at the share of spending on vehicles, the relationship with the logarithm of total consumption is clearly positive and significant in a linear specification (column 3), and the addition of a quadratic term yields significant evidence of a convex relationship (column 4). In other words, for a given percent increase in total consumption, the increase in the share of spending in total consumption is greater the higher the initial level of total consumption. A slightly better fit for the relationship between the share of vehicles and total consumption is obtained by estimating a fractional polynomial regression (a more flexible approach compared to traditional polynomial models). The estimation results are reported in table 4.

Figure 13 shows the estimated lines of best fit (linear, column 1, table 3 for food; nonlinear, fractal polynomial regression, table 4 for vehicles). The convex relationship for vehicles has significant implications. First, it highlights the importance of an approach that analyzes household-level information rather than relying on a country's per capita income. As noted in the introduction, "aggregation" is appropriate only if Engel curves are linear. Second, as large numbers of individuals move into higher income groups, the demand for vehicles will rise progressively faster, posing challenges for infrastructure, energy consumption, and climate change.

VII. CONCLUSIONS

Using household survey data and an exhaustive set of projections for the growth of output and population, we have shown that worldwide income inequality is expected to continue to decline over the next two decades. Consistent with economic growth and its distribution across countries and individuals, hundreds of millions of people will be lifted out of abject poverty, hundreds of millions (with the largest net gain occurring in Sub-Saharan Africa) will join the "working poor" class that can afford basic consumer goods, hundreds of millions (with the largest gain in India) will start using consumer durables such as refrigerators and cars, and hundreds of millions (with the largest gain in China) will reach consumption in absolute levels (at constant prices) that we currently associate with median incomes in the advanced economies. These developments will bring business opportunities but also pressures on the environment and challenges for policymakers, both domestically (such as the need for infrastructure) and worldwide (such as climate change).

The decline in global inequality will be less marked if the pace of economic growth slows in emerging markets and converges on the worldwide mean. But successful economic reforms and resulting growth in a few large low-income economies, particularly India, could generate meaningful reductions in global inequality. Rapid growth in China, while beneficial for the country's large population and the world economy, would no longer reduce global income inequality because the median income for Chinese residents has already overtaken the worldwide median.

The next step in our research is to build on the estimates presented in this study to deepen our analysis of the implications for consumption and associated policy challenges. We have analyzed household survey studies for many countries and estimated Engel curves for both broad categories of spending (such as food or transportation) and individual goods (such as cars). On the basis of the estimated relationships, we are in the process of projecting worldwide consumption of such items, with a view to drawing policy implications.

REFERENCES

Anand, Sudhir, and Paul Segal. 2008. What Do We Know about Global Income Inequality? *Journal of Economic Literature* (March): 57–94.

Atkinson, Anthony B., Thomas Piketty, and Emmanuel Saez. 2011. Top Incomes in the Long Run of History. *Journal of Economic Literature* (March): 3–71.

Banks, James, Richard Blundell, and Arthur Lewbel. 1997. "Quadratic Engel Curves and Consumer Demand." *Review of Economics and Statistics* 79, no. 4: 527–39.

Bhalla, Surjit S. 2002. *Imagine There's No Country: Poverty, Inequality, and Growth in the Era of Globalization.* Washington: Institute for International Economics.

Bongaarts, John, and Rodolfo A. Bulatao, eds. 2000. *Beyond Six Billion: Forecasting the World's Population.* Washington: National Academy Press.

Chamon, Marcos, Paolo Mauro, and Yohei Okawa. 2008. Cars: Mass Car Ownership in the Emerging Market Giants. *Economic Policy*, April, 243–96.

Chen, Shaohua, and Martin Ravallion. 2010. The Developing World is Poorer than We Thought, But No Less Successful in the Fight Against Poverty. *Quarterly Journal of Economics* 125, no. 4: 1577–625.

Cline, William R. 2004. *Trade Policy and Global Poverty*. Washington: Institute for International Economics

Deaton, Angus. 2005. Measuring Poverty in a Growing World (or Measuring Growth in a Poor World). *Review of Economics and Statistics* 87, no. 1: 1–19.

Dollar, David, Tatjana Kleineberg, and Aart Kraay. 2013. *Growth Still Is Good for the Poor*. Policy Research Working Paper no. 6568. Washington: World Bank.

Dollar, David, Tatjana Kleineberg, and Aart Kraay. 2014. *Growth, Inequality, and Social Welfare: Cross-Country Evidence*. Policy Research Working Paper no. 6842. Washington: World Bank.

Ho, Giang, and Paolo Mauro. 2014. *Growth: Now and Forever?* IMF Working Paper no. 14/117. Washington: International Monetary Fund.

Jenkins, Stephen P. 2014. *World Income Inequality Databases: An Assessment of WIID and SWIID*. IZA Discussion Paper no. 8501. Bonn: Institute for the Study of Labor (IZA). Available at http://ssrn.com/abstract=2505363.

Johansson, Åsa, Yvan Guillemette, Fabrice Murtin, David Turner, Giuseppe Nicoletti, Christine de la Maisonneuve, Phillip Bagnoli, Guillaume Bousquet, and Francesca Spinelli. 2013. *Long-Term Growth Scenarios*. OECD Economics Department Working Paper no. 1000. Paris: Organization for Economic Cooperation and Development.

Kharas, Homi. 2010. *The Emerging Middle Class in Developing Countries*. OECD Development Centre Working Paper no. 285. Paris: Organization for Economic Cooperation and Development.

Lakner, Christoph, and Branko Milanović. 2013. *Global Income Distribution: From the Fall of the Berlin Wall to the Great Recession*. World Bank Working Paper no. 6719. Washington: World Bank.

Lewbel, Arthur. 2006. Engel Curves. *New Palgrave Dictionary of Economics*, 2nd ed. Basingstoke, UK: Palgrave Macmillan.

Luxembourg Income Study (LIS) Database, http://www.lisdatacenter.org (multiple countries). Luxembourg: LIS.

Milanović, Branko. 2002. True World Income Distribution, 1988 and 1993: First Calculation Based on Household Surveys Alone. *Economic Journal* 112, no. 476: 51–92.

Milanović, Branko. 2005. *Worlds Apart: Measuring International and Global Inequality*. Princeton and Oxford: Princeton University Press.

Pinkovskiy, Maxim, and Xavier Sala-i-Martín. 2010. *African Poverty Is Falling...Much Faster than You Think!* NBER Working Paper no. 15775. Cambridge, MA: National Bureau of Economic Research.

Pritchett, Lant, and Lawrence H. Summers. 2014. *Asiaphoria Meets Regression to the Mean*. NBER Working Paper no. 20573. Cambridge, MA: National Bureau of Economic Research.

Sala-i-Martín, Xavier. 2006. The World Distribution of Income: Falling Poverty and…Convergence, Period. *Quarterly Journal of Economics* 121, no. 2: 351–97.

Solt, Frederick. 2014. The Standardized World Income Inequality Database. Working Paper, University of Iowa. Available at http://myweb.uiowa.edu/fsolt/papers/Solt2014.pdf (accessed in February 2015).

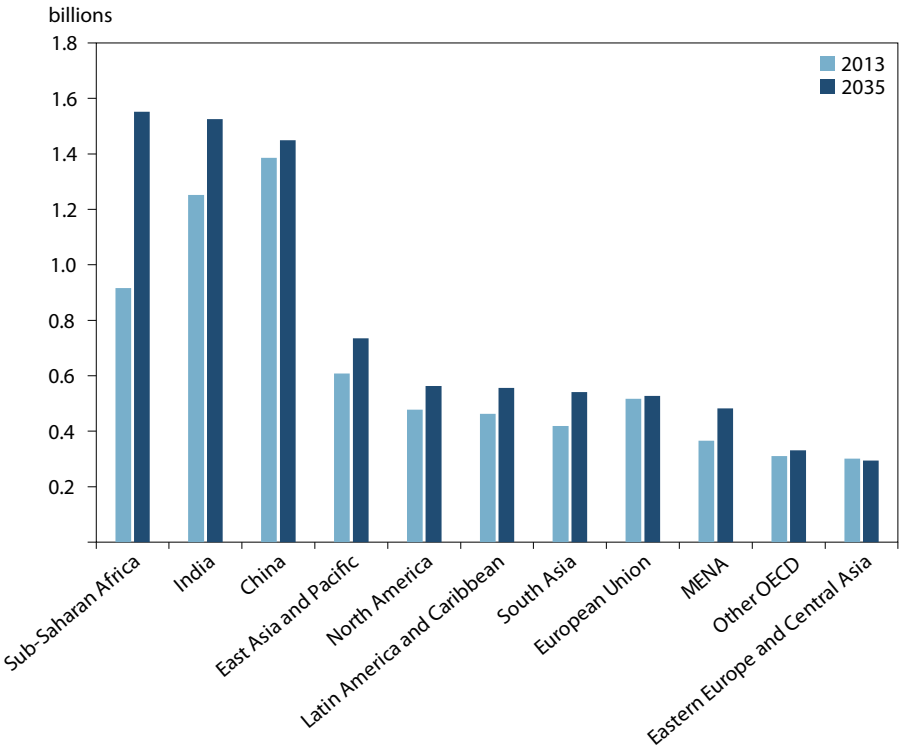
Table 1 Sources of GDP per capita growth projections, 2014–35

Projection source	Number of countries	Countries	Percent of world GDP in PPP in 2013	Percent of world population in 2013
OECD	40	OECD members, BRICs, and Indonesia	79	65
Consensus Forecasts	16	Argentina, Venezuela, Ukraine, etc.	7	7
IMF/World Bank teams for DSA	69	Mostly low income: Afghanistan, Bolivia, Bangladesh, etc.	4	18
$g_{2014–35} = \alpha + \beta g_{[\text{past growth}]}$	62	Albania, Algeria, Belarus, Iran, etc.	10	11

BRICs = Brazil, Russia, India, China; IMF = International Monetary Fund; DSA = debt sustainability analysis; PPP = purchasing power parity; OECD = Organization for Economic Cooperation and Development

Sources: Consensus Forecasts (available at www.consensuseconomics.com); IMF/World Bank; OECD "Looking to 2060" website, www.oecd.org/eco/outlook/lookingto2060.htm; equation = authors' projection.

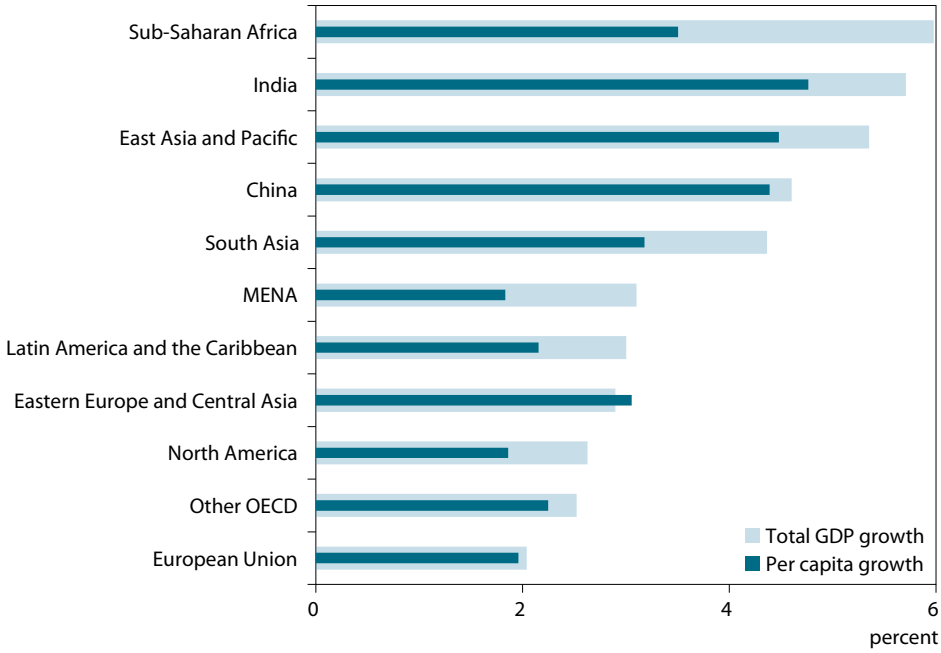
Figure 1 Population, 2013 and 2035



MENA = Middle East and North Africa; OECD = Organization for Economic Cooperation and Development

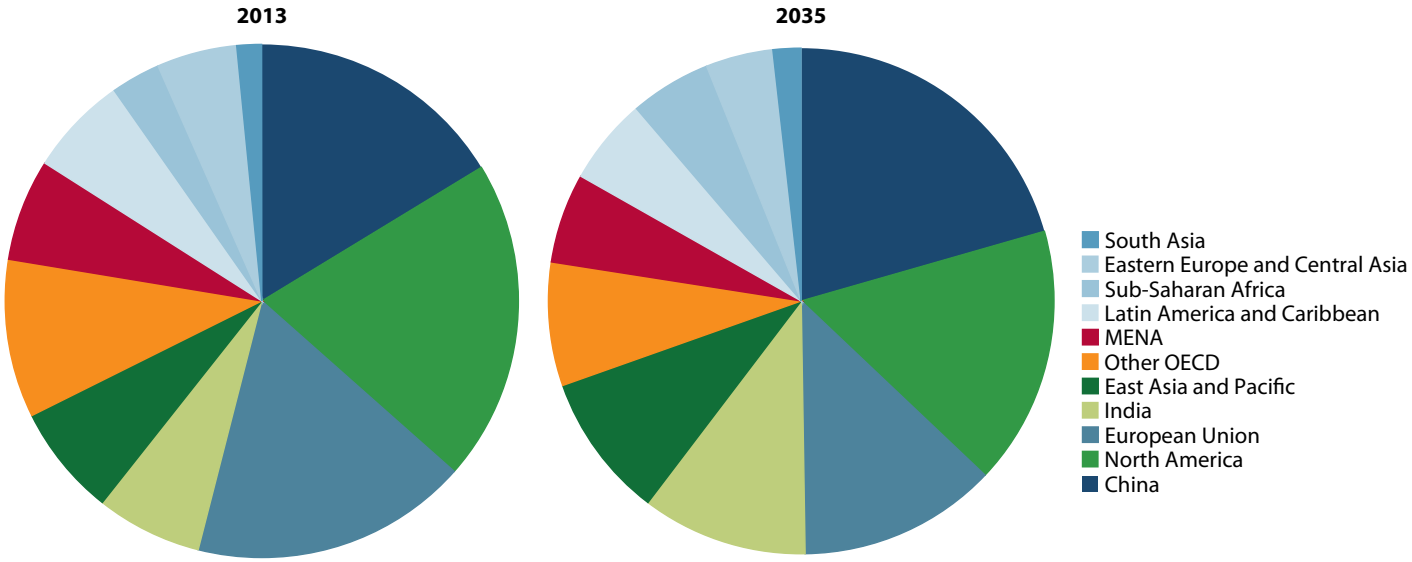
Source: United Nations.

Figure 2 Regional annual growth rates between 2013 and 2035, weighted by the initial population



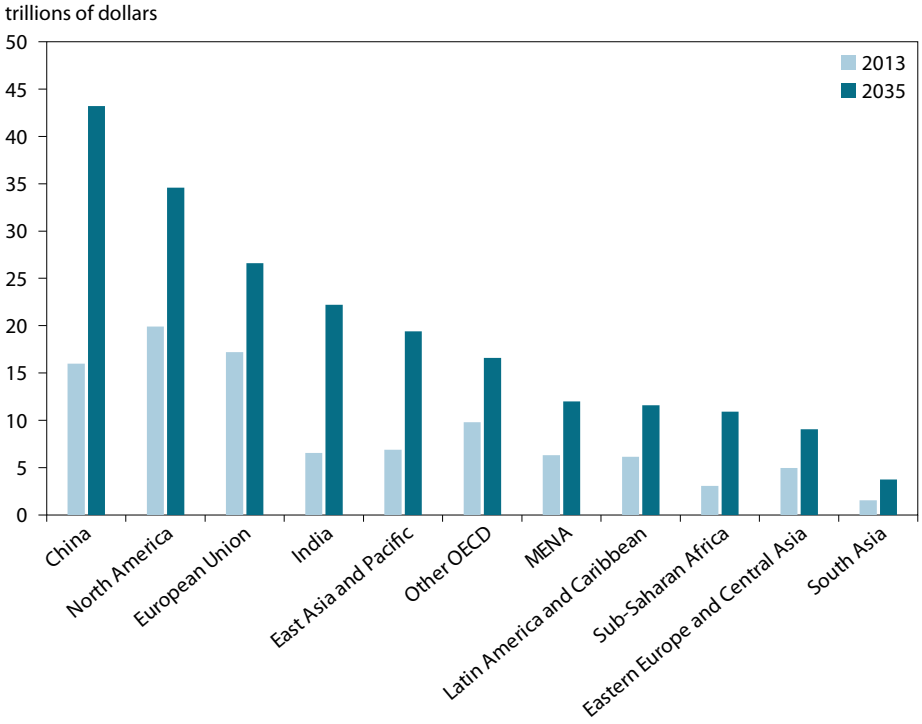
MENA = Middle East and North Africa; OECD = Organization for Economic Cooperation and Development
Sources: OECD, Consensus Forecasts, IMF/World Bank, and authors' own forecasts.

Figure 3 Regional shares of total GDP, 2013 and 2035 (percent)



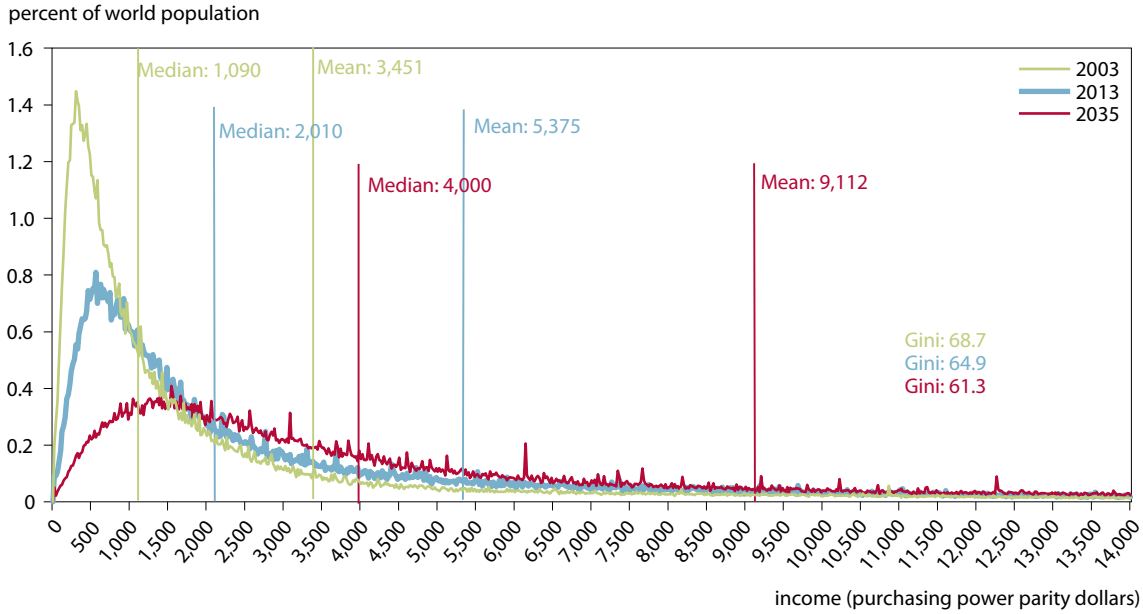
MENA = Middle East and North Africa; OECD = Organization for Economic Cooperation and Development
Sources: OECD, Consensus Forecasts, IMF/World Bank, and authors' forecasts.

Figure 4 Total GDP, 2013 and 2035



MENA = Middle East and North Africa; OECD = Organization for Economic Cooperation and Development
Sources: OECD, Consensus Forecasts, IMF/World Bank, and authors' forecasts.

Figure 5 Frequency plot of global income distribution, 2003, 2013, and 2035

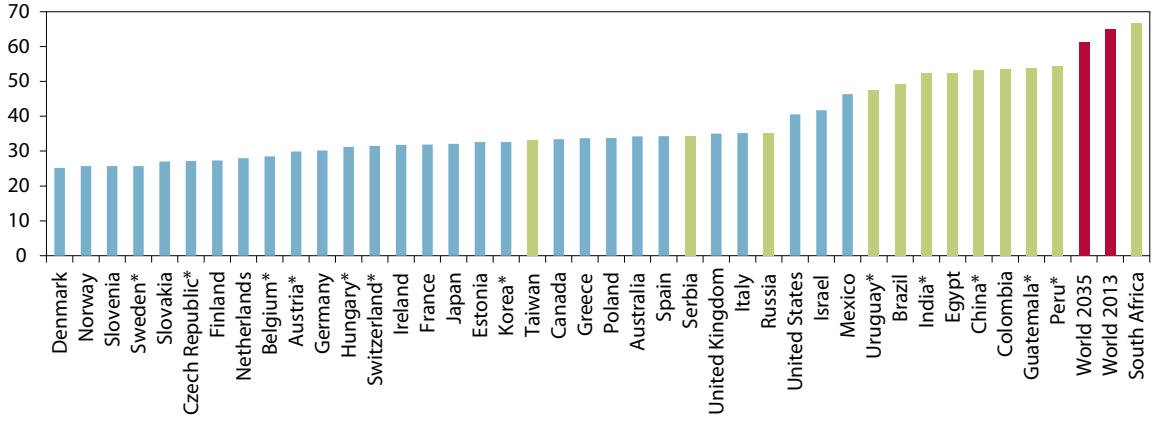


Notes: Percent of world population for each $20 interval is reported on the vertical axis. Individual incomes on the horizontal axis are expressed in US dollars at 2011 international prices (purchasing power parity)

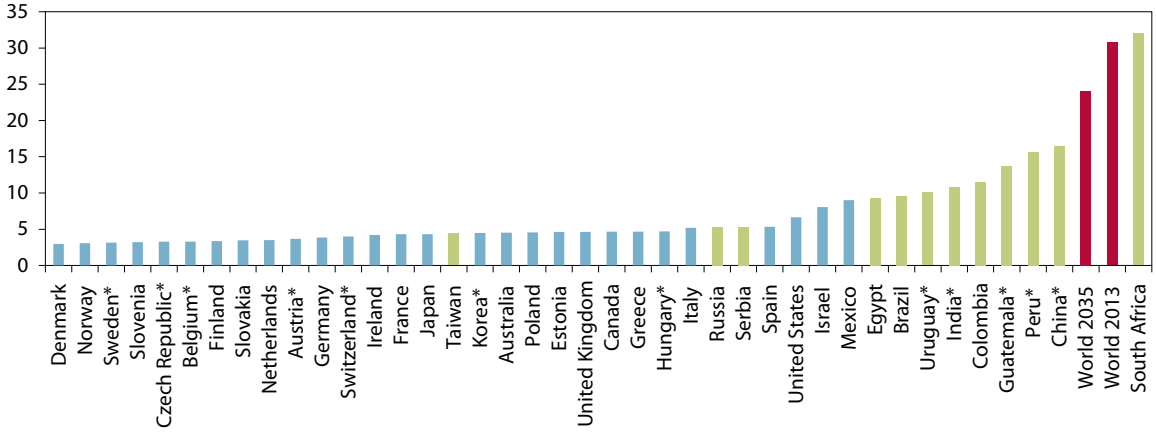
Sources: OECD, Consensus Forecasts, IMF/World Bank, and authors' forecasts for growth; United Nations for population projections; Luxembourg Income Study and World Bank for household survey data on income distribution.

Figure 6 Inequality measures for world and countries in LIS sample (Gini index ranging from 0 to 100; and 90:10 ratio in percent)

Gini index on household per capita disposable income in late 2000s



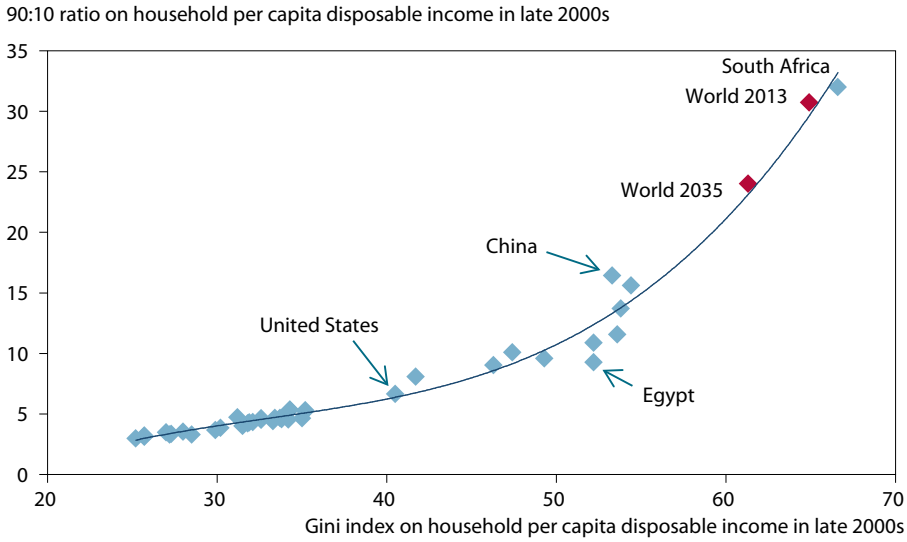
90:10 ratio on household per capita disposable income in late 2000s



* = Data for some countries are for early to mid-2000s: Austria (2004), Belgium (2000), China (2002), Czech Republic (2004), Guatemala (2006), Hungary (2005), India (2004), Korea (2006), Peru (2004), Sweden (2005), Switzerland (2004), and Uruguay (2004).

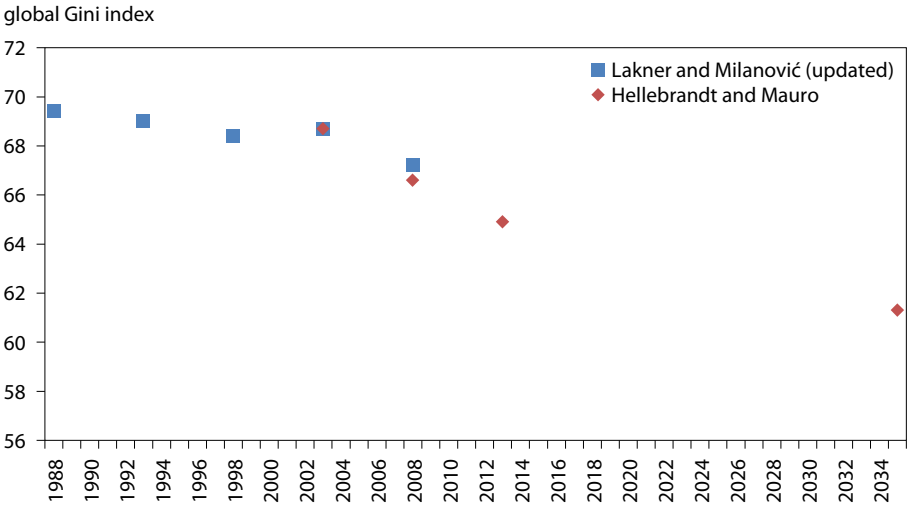
Notes: Gini coefficient computed by the authors from Luxembourg Income Study (LIS) data for the late 2000s (early to mid-2000s where indicated by an asterisk; see appendix C for detail). OECD countries shown in blue, non-OECD countries in green.
Sources: Luxembourg Income Study dataset; authors' calculations.

Figure 7 Nonlinear association between the 90:10 ratio (in percent) and the Gini index (ranging from 0 to 100)



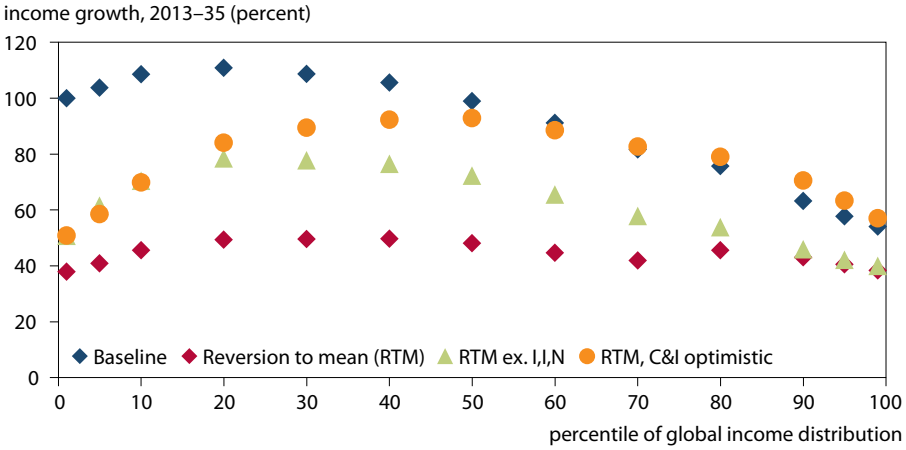
Sources: OECD, Consensus Forecasts, IMF/World Bank, and authors' forecasts for growth; United Nations for population projections; Luxembourg Income Study and World Bank for household survey data on income distribution.

Figure 8 Gini index of global income inequality (ranging between 0 and 100), 1988–2035



Sources: Lakner and Milanović (2013) updated for 2011 purchasing power parities, and authors' calculations.

Figure 9 Income growth for each percentile of the global income distribution



C&I = China and India; ex. I,I,N = except India, Indonesia, and Nigeria

Notes: Each point in the chart is calculated using the formula $100*(Y_{2035}/Y_{2013}) - 100$, where Y_{2035} is the income at the respective percentile in the global income distribution for 2035 under the scenario specified and Y_{2013} is the income in the respective percentile in the distribution for 2013.

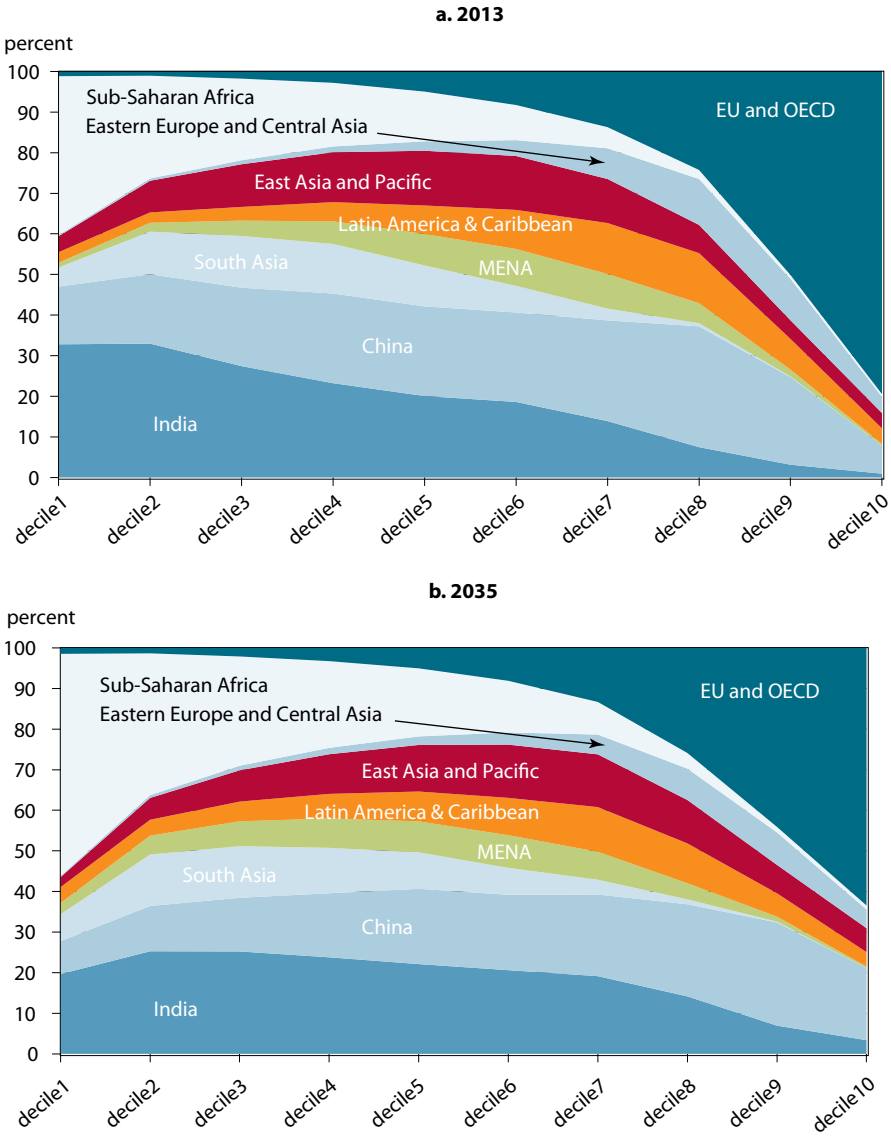
Sources: Authors' calculations based on household data from Luxembourg Income Study and World Bank surveys.

Table 2 Changes in Gini coefficient, 2013–35, using household data vs. per capita incomes

	Gini coefficient in 2013	Gini coefficient in 2035	Change
Baseline projections			
No within-country information	49.6	44.6	–5.0
Preferred (household-level information)	64.9	61.3	–3.6
Reversion to the mean			
No within-country information	49.6	49.7	0.1
Preferred (household-level information)	64.9	64.2	–0.7

Source: Authors' calculations.

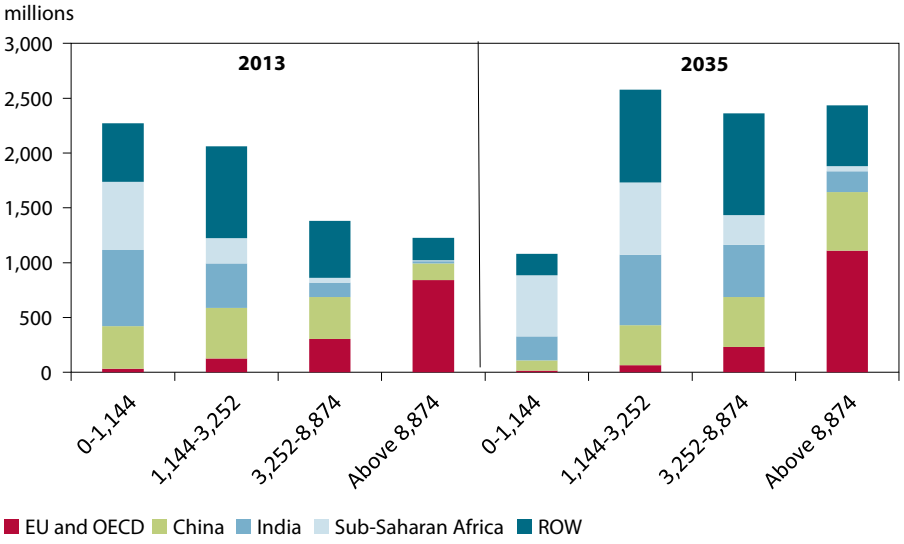
Figure 10 Geographic distribution of world population by income decile, 2013 and 2035



MENA = Middle East and North Africa; EU and OECD = European Union and Organization for Economic Cooperation and Development

Sources: OECD, Consensus Forecasts, IMF/World Bank, and authors' forecasts for growth; United Nations for population projections; Luxembourg Income Study and World Bank for household survey data on income distribution.

Figure 11 Number of individuals worldwide and their regional distribution, by absolute income range

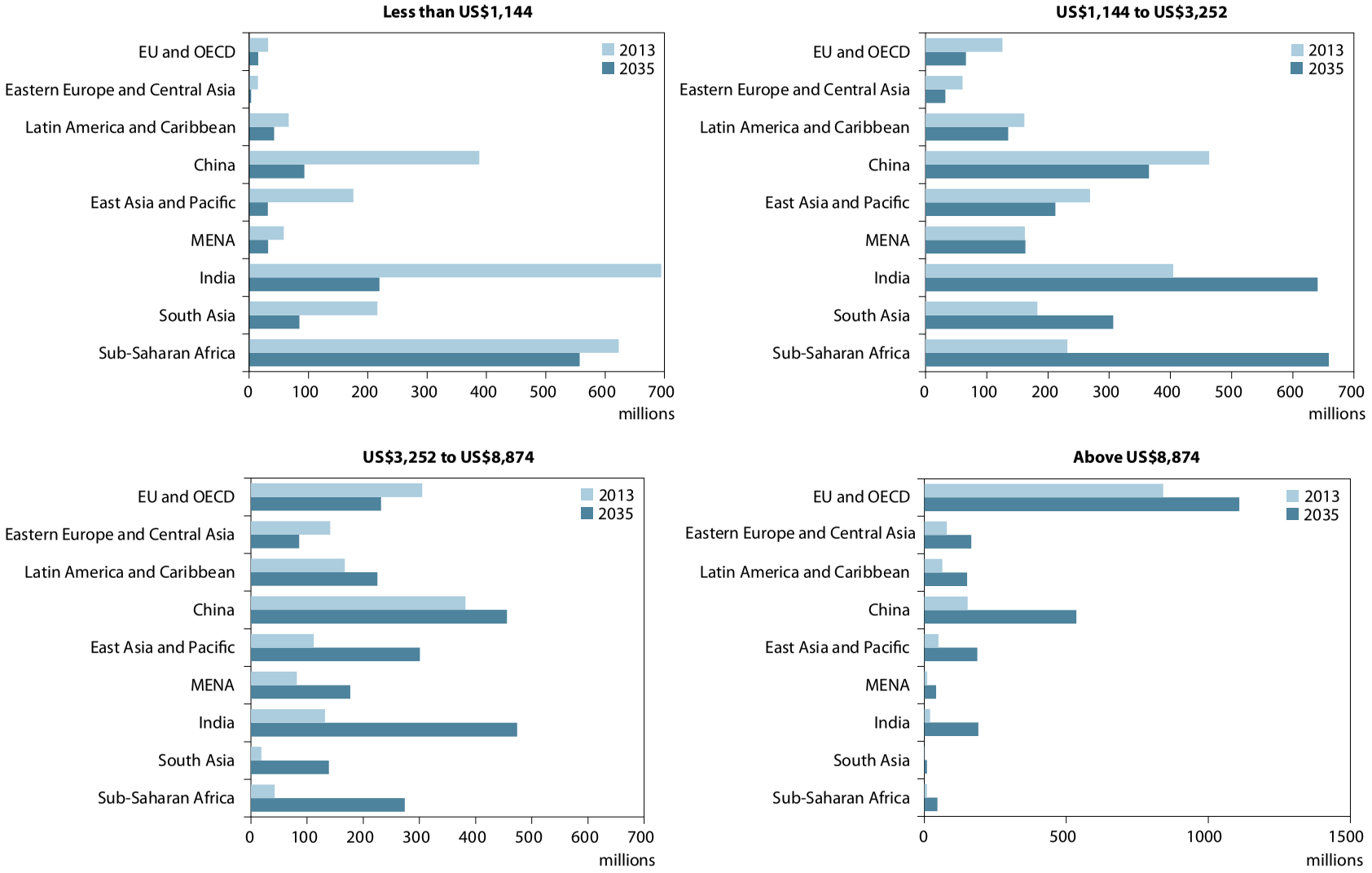


ROW = rest of the world; EU = European Union; OECD = Organization for Economic Cooperation and Development

Notes: Ranges on the horizontal axis are expressed in 2011 international US dollars and correspond to those used by the World Bank in its Global Consumption Database. Income thresholds have been converted into 2013 prices and are expressed in annual terms.

Sources: OECD, Consensus Forecasts, IMF/World Bank, and authors' forecasts for growth; United Nations for population projections; LIS and World Bank for household survey data on income distribution.

Figure 12 Number of individuals in each region for four groups of absolute income ranges, 2013 and 2035



MENA = Middle East and North Africa; EU = European Union; OECD = Organization for Economic Cooperation and Development

Notes: Incomes expressed in 2011 international US dollars. Ranges correspond to those used by the World Bank in its Global Consumption Database. Income thresholds have been converted to 2013 prices and are expressed in annual terms. Regions are presented in declining order of population-weighted survey mean income.

Sources: OECD, Consensus Forecasts, IMF/World Bank, and authors' forecasts for growth; United Nations for population projections; Luxembourg Income Study and World Bank for household survey data on income distribution.

Table 3 Linear and quadratic regressions, shares of food and vehicles vs. log of consumption

	Food share	Food share	Vehicle share	Vehicle share
	(1)	(2)	(3)	(4)
Ln(Expenditures)	−0.108***	−0.0827	0.0507***	−0.279***
	(0.00419)	(0.0618)	(0.00310)	(0.0450)
Ln(Expenditures)^2		−0.00161		0.0206***
		(0.00385)		(0.00280)
Constant	1.206***	1.105***	−0.306***	0.988***
	(0.0337)	(0.245)	(0.0250)	(0.178)
R^2	0.523	0.523	0.305	0.361

Note: Standard errors in parentheses; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. The data refer to "vehicles and other transportation."

Source: World Bank, Global Consumption Database.

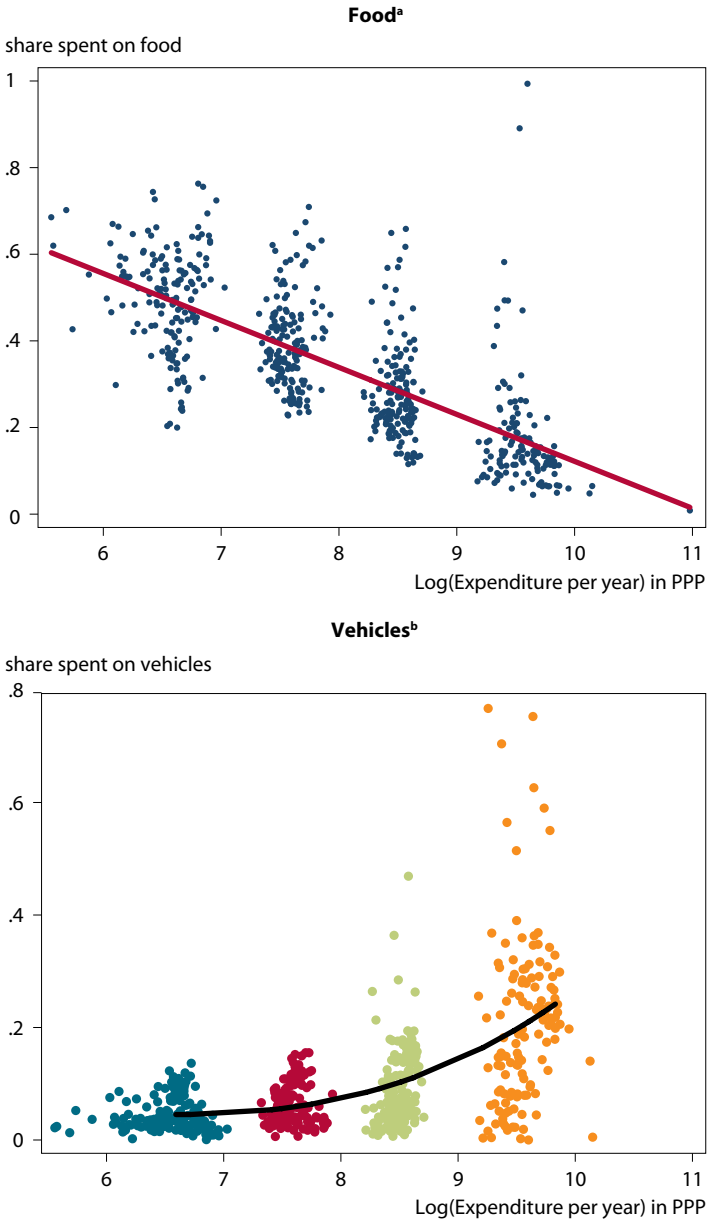
Table 4 Nonlinear relationship between total consumption and spending on vehicles

	Vehicle share
[Ln(Expenditures)^3] − 505.3	−0.00284***
	(0.000591)
Ln(Expenditures)^3 * [Ln(Expenditures) − 1048.6]	0.00127***
	(0.000242)
Constant	0.0723***
	(0.00471)
Adjusted R^2	0.362

Note: Standard errors in parentheses; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. The data refer to "vehicles and other transportation."

Source: World Bank, Global Consumption Database.

Figure 13 Share of food and vehicles in total consumption vs. log of total consumption



PPP = purchasing power parity

a. Includes fruit and vegetables, meat and fish, grains, dairy, other food and catering.
b. Transportation and other vehicles.

Source: World Bank.

APPENDIX A MEAN OF INCOME FROM SURVEYS OR GDP PER CAPITA?

As reported in the main text, worldwide per capita GDP amounted to about US$14,000 in 2013, expressed in 2011 international US dollars, whereas the mean disposable income from household-level surveys was estimated at US$5,400, equivalent to 39 percent of GDP per capita. The gap varies across countries, within a range of 25–50 percent for the Luxembourg Income Study (LIS) sample (figure A.1). It tends to be somewhat larger for the developing and emerging economies than for the advanced economies.

Although the sources of such large gaps between mean survey incomes and GDP per capita are not fully understood, they reflect several factors, including the following:

- GDP per capita significantly overstates household disposable income because GDP includes items such as depreciation, retained earnings of corporations, and government revenues that are not distributed back to households as cash transfers (Anand and Segal 2008). In the United States, for example, the Bureau of Economic Analysis National Income and Product Accounts indicate that disposable personal income was about 74 percent of GDP in 2013. This gap may be much larger in developing countries where a significant share of government revenue ends up in sovereign wealth funds or a significant portion of GDP represents profits of foreign multinationals that are repatriated. Although the United States and a few other countries report personal disposable income in their national accounts, most do not.
- Household surveys likely understate income both because the rich are underrepresented in the responses and because when the rich respond they tend to underreport their incomes. Tax returns data from the World Top Incomes Database, which should offer a more accurate picture of the incomes of the rich (though even these data may be subject to downward bias due to tax avoidance and evasion), show that the share of income going to the top 5 percent of taxpayers ranged from 17 percent (Denmark) to 37 percent (United States) in recent years (out of a small sample of countries for which these data are available).

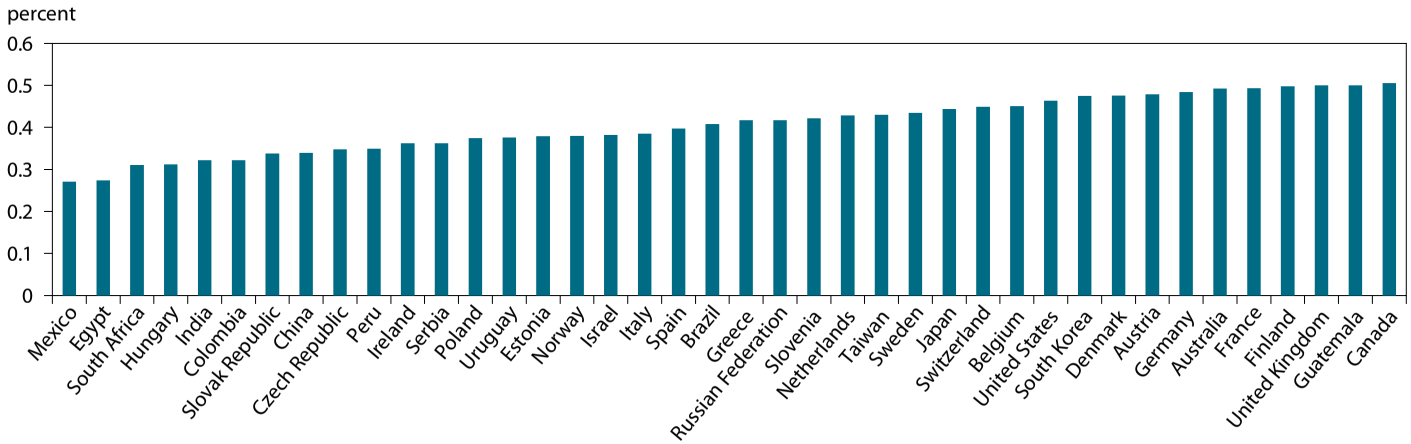
These two factors may be large enough to account for the gap between survey incomes and GDP per capita.

Because household surveys understate the incomes of the rich, our results are best interpreted as relating to the vast majority of each country's population, excluding those at the very top, who account for a small portion of the population but a significant portion of income. Their exclusion is unlikely to distort the shape of the histogram in figure 5 (except for the right-hand tail) but likely to lead to an underestimate of global inequality.

One could attempt to deal with this problem by scaling up the incomes reported in surveys to a national account aggregate—for example, household final consumption expenditure (HFCE). However, this would likely amount to assigning the unreported income of the rich throughout the distribution in proportion to households' reported incomes. And as the gap between survey incomes and HFCE is, on average, larger in developing than in advanced economies, the effect would be to boost (adjusted) mean incomes in the poorer countries, thereby excessively reducing measured global inequality compared with the method using survey means.

A more promising method of scaling up has been explored by Lakner and Milanović (2013) who, in an alternative estimation, assigned unreported income only to the top decile in each country. The effect of this adjustment is to increase inequality both within countries and globally. Regardless of how such scaling up is done, a further problem with HFCE is that it is calculated as a residual; thus, errors in estimating GDP as well as governments' and firms' consumption are attributed to HFCE (Anand and Segal 2008).

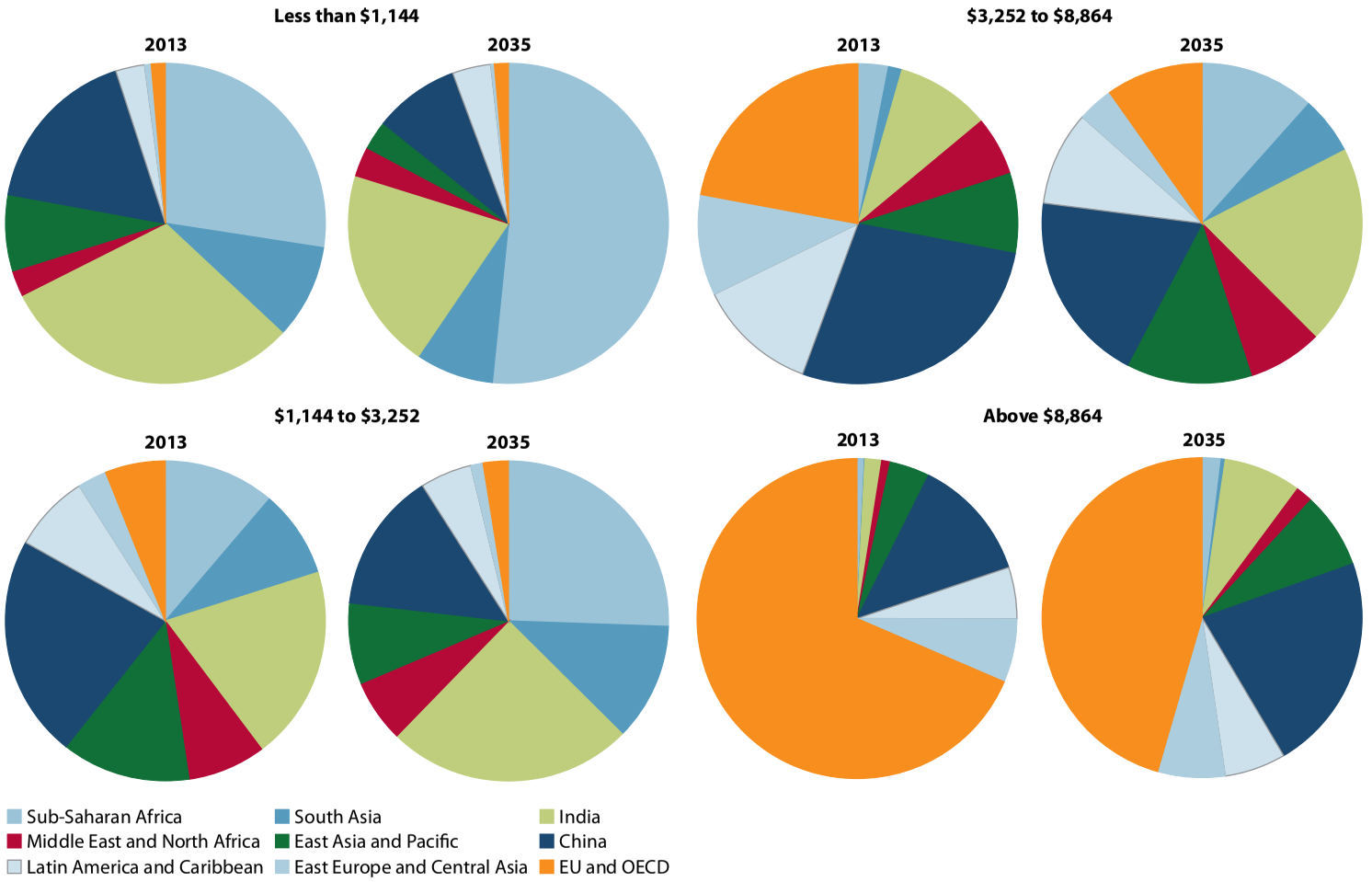
Figure A.1 Mean of income survey as a ratio of GDP per capita



Note: Data on per capita GDP refer to 2013. The mean of the household income survey refers to the latest available year, multiplied by one plus the growth rate of per capita consumption from the national accounts from that year to 2013.

Sources: Luxembourg Income Study (mean of income survey); World Bank, World Development Indicators (per capita GDP).

APPENDIX B WORLDWIDE DEVELOPMENTS IN INDIVIDUAL INCOMES, BY INCOME BRACKET



EU and OECD = European Union and Organization for Economic Cooperation and Development

Notes: Absolute incomes expressed in 2011 international US dollars. Income ranges correspond to those used by the World Bank in its Global Consumption Database. Income thresholds have been converted into 2013 prices and are expressed in annual terms. Regions are in declining order of population-weighted survey mean income.

Sources: OECD, Consensus Forecasts, IMF/World Bank, and authors' forecasts for growth; United Nations for population projections; LIS and World Bank for household survey data on income distribution.

APPENDIX C DATA SOURCES, GROWTH, AND POPULATION PROJECTIONS FOR INDIVIDUAL COUNTRIES

Region/country	Advanced or emerging	Growth projection source	2014-35 per capita growth	2014-35 total growth	Reversion to mean (per capita growth)	Inequality data source	Survey year	Gini coefficient	Share of world GDP in 2013	Share of world GDP in 2035	Share of world population in 2013	Share of world population in 2035
North America												
Canada	A	OECD	1.3	2.1	1.4	LIS	2010	33.4	1.50	1.11	0.50	0.49
Mexico	E	OECD	2.2	3.1	1.2	LIS	2010	46.3	2.02	1.86	1.74	1.73
United States	A	OECD	1.8	2.5	1.4	LIS	2013	40.5	16.73	13.53	4.56	4.36
European Union												
Austria	A	OECD	1.7	2.1	1.4	LIS	2004	29.9	0.37	0.27	0.12	0.11
Belgium	A	OECD	1.6	1.9	1.3	LIS	2000	28.5	0.44	0.31	0.16	0.14
Bulgaria	E	Consensus	available	available	2.0	PovcalNet	2011	34.3	0.12	0.10	0.10	0.07
Croatia	E	Consensus	available	available	1.6	PovcalNet	2008	33.6	0.09	0.06	0.06	0.05
Cyprus	A	Own	1.2	1.9	1.2	WIID	2011	29.1	0.03	0.02	0.02	0.02
Czech Republic	A	OECD	2.9	3.1	1.7	LIS	2004	27.2	0.29	0.26	0.15	0.13
Denmark	A	OECD	1.6	2.0	1.2	LIS	2010	25.2	0.24	0.17	0.08	0.07
Estonia	A	OECD	3.0	2.6	2.5	LIS	2010	32.6	0.03	0.03	0.02	0.01
Finland	A	OECD	1.9	2.1	1.6	LIS	2010	27.3	0.21	0.15	0.08	0.07
France	A	OECD	1.9	2.3	1.2	LIS	2010	31.9	2.35	1.82	0.92	0.82
Germany	A	OECD	1.4	1.1	1.3	LIS	2010	30.2	3.53	2.11	1.18	0.91
Greece	A	OECD	2.8	2.7	1.1	LIS	2010	33.7	0.28	0.23	0.16	0.13
Hungary	E	OECD	2.1	1.8	1.6	LIS	2012	31.2	0.23	0.16	0.14	0.11
Ireland	A	OECD	1.8	2.6	2.0	LIS	2010	31.8	0.20	0.17	0.07	0.06
Israel	A	OECD	1.8	3.1	1.5	LIS	2010	41.7	0.24	0.22	0.11	0.12
Italy	A	OECD	1.6	1.6	1.0	LIS	2010	35.2	2.04	1.35	0.87	0.71
Latvia	A	Consensus	available	available	2.6	PovcalNet	2011	36.0	0.05	0.04	0.03	0.02
Lithuania	E	Consensus	available	available	2.4	PovcalNet	2011	32.6	0.08	0.08	0.04	0.03
Luxembourg	A	OECD	1.3	2.3	1.4	n.a.	n.a.	n.a.	0.05	0.04	0.01	0.01
Malta	A	Own	1.6	1.6	1.6	n.a.	n.a.	n.a.	0.01	0.01	0.01	0.01
Netherlands	A	OECD	2.0	2.2	1.3	LIS	2010	28.0	0.71	0.54	0.24	0.20
Poland	E	OECD	2.2	2.0	2.3	LIS	2010	33.8	0.87	0.64	0.54	0.43
Portugal	A	OECD	2.0	1.9	1.2	WIID	2011	34.2	0.27	0.19	0.15	0.12
Romania	E	Consensus	available	available	2.0	PovcalNet	2011	35.3	0.40	0.38	0.31	0.23
Slovak Republic	A	OECD	2.5	2.4	2.2	LIS	2010	27.0	0.14	0.11	0.08	0.06
Slovenia	A	OECD	2.0	2.0	1.7	LIS	2010	25.7	0.06	0.04	0.03	0.02
Spain	A	OECD	1.5	1.6	1.3	LIS	2010	34.3	1.47	0.98	0.67	0.57
Sweden	A	OECD	2.0	2.7	1.6	LIS	2010	25.7	0.41	0.34	0.14	0.13
United Kingdom	A	OECD	2.1	2.6	1.5	LIS	2010	35.0	2.25	1.84	0.90	0.82

(continues)

Other OECD												
Australia	A	OECD	2.1	3.2	1.5	LIS	2010	34.2	1.01	0.96	0.33	0.35
Chile	E	OECD	3.4	4.1	2.0	PovcalNet	2011	50.8	0.39	0.44	0.25	0.24
Iceland	A	OECD	1.3	2.1	1.5	n.a.	n.a.	n.a.	0.01	0.01	0.00	0.00
Japan	A	OECD	1.5	1.1	1.1	LIS	2008	32.1	4.58	2.76	1.81	1.37
South Korea	A	OECD	2.5	2.8	2.3	LIS	2006	32.6	1.64	1.40	0.70	0.61
New Zealand	A	OECD	1.8	2.6	1.5	WIID	2009	31.7	0.15	0.12	0.06	0.06
Norway	A	OECD	1.5	2.3	1.4	LIS	2010	25.7	0.32	0.25	0.07	0.07
Switzerland	A	OECD	1.5	2.5	1.2	LIS	2004	31.5	0.42	0.34	0.12	0.12
Turkey	E	OECD	3.3	4.1	1.7	PovcalNet	2011	40.0	1.42	1.62	1.07	1.05
China												
China	E	OECD	4.4	4.6	4.0	LIS	2002	53.3	16.22	20.48	19.75	16.93
Macao, China	E	Own	2.9	4.1	2.9	n.a.	n.a.	n.a.	0.08	0.09	0.01	0.01
India	E	OECD	4.8	5.7	2.6	LIS	2004	52.2	6.66	10.60	17.85	17.82
Latin America & Caribbean												
Antigua and Barbuda	E	Own	1.1	1.9	1.1	n.a.	n.a.	n.a.	0.00	0.00	0.00	0.00
Argentina	E	Consensus	available	available	n.a.	WIID	2010	42.0	0.77	0.64	0.59	0.56
Bahamas, The	E	Own	1.0	1.9	1.0	n.a.	n.a.	n.a.	0.01	0.01	0.01	0.01
Barbados	E	Own	1.3	1.6	1.3	n.a.	n.a.	n.a.	0.00	0.00	0.00	0.00
Belize	E	Own	1.3	3.1	1.3	n.a.	n.a.	n.a.	0.00	0.00	0.00	0.01
Bermuda	E	Own	1.3	1.3	1.3	n.a.	n.a.	n.a.	0.00	0.00	0.00	0.00
Bolivia	E	IMF/WB	2.7	4.2	1.6	PovcalNet	2012	46.6	0.06	0.07	0.15	0.17
Brazil	E	OECD	2.0	2.6	1.5	LIS	2011	49.3	2.96	2.44	2.86	2.65
Colombia	E	Consensus	available	available	1.5	LIS	2010	53.6	0.59	0.71	0.69	0.69
Costa Rica	E	Own	1.7	2.6	1.7	PovcalNet	2012	48.6	0.07	0.06	0.07	0.07
Dominica	E	IMF/WB	1.5	1.8	1.4	n.a.	n.a.	n.a.	0.00	0.00	0.00	0.00
Dominican Republic	E	Own	2.1	3.0	2.1	PovcalNet	2012	45.7	0.12	0.11	0.15	0.15
Ecuador	E	Own	1.4	2.6	1.4	PovcalNet	2012	46.6	0.16	0.13	0.22	0.24
El Salvador	E	Own	1.5	1.9	1.5	PovcalNet	2012	41.8	0.05	0.03	0.09	0.08
Grenada	E	IMF/WB	2.5	2.5	1.6	n.a.	n.a.	n.a.	0.00	0.00	0.00	0.00
Guatemala	E	Own	1.2	3.4	1.2	LIS	2006	53.8	0.11	0.11	0.22	0.29
Guyana	E	IMF/WB	3.1	3.4	1.6	n.a.	n.a.	n.a.	0.01	0.01	0.01	0.01
Haiti	E	IMF/WB	3.6	4.7	1.3	PovcalNet	2001	59.2	0.02	0.02	0.15	0.15
Honduras	E	IMF/WB	1.4	3.0	1.3	PovcalNet	2011	57.4	0.04	0.03	0.12	0.13
Jamaica	E	Own	0.9	1.1	0.9	PovcalNet	2002	65.7	0.02	0.01	0.04	0.03
Nicaragua	E	IMF/WB	2.9	4.0	1.6	PovcalNet	2005	51.2	0.03	0.03	0.09	0.09
Panama	E	Own	2.2	3.5	2.2	PovcalNet	2012	51.9	0.07	0.07	0.06	0.06
Paraguay	E	Own	1.3	2.7	1.3	PovcalNet	2012	48.0	0.05	0.04	0.10	0.11
Peru	E	Consensus	available	available	2.2	LIS	2004	54.4	0.35	0.49	0.43	0.44
Puerto Rico	E	Own	1.2	1.2	1.2	WIID	2003	55.8	0.13	0.08	0.05	0.04
St. Kitts and Nevis	E	Own	1.3	2.1	1.3	n.a.	n.a.	n.a.	0.00	0.00	0.00	0.00

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APPENDIX C DATA SOURCES, GROWTH, AND POPULATION PROJECTIONS FOR INDIVIDUAL COUNTRIES *(continued)*

St. Lucia	E	IMF/WB	2.0	2.5	1.2	n.a.	n.a.	n.a.	0.00	0.00	0.00	0.00
St. Vincent and Grenadines	E	IMF/WB	2.9	3.0	1.7	n.a.	n.a.	n.a.	0.00	0.00	0.00	0.00
Suriname	E	Own	1.7	2.3	1.7	n.a.	n.a.	n.a.	0.01	0.01	0.01	0.01
Uruguay	E	Own	1.8	2.1	1.8	LIS	2004	47.4	0.07	0.05	0.05	0.04
Venezuela	E	Consensus	available	available	1.0	PovcalNet	2006	44.8	0.54	0.35	0.43	0.45
East Asia & Pacific												
Brunei Darussalam	E	Own	0.7	1.7	0.7	n.a.	n.a.	n.a.	0.03	0.02	0.01	0.01
Cambodia	E	IMF/WB	6.1	7.5	2.7	PovcalNet	2011	31.8	0.05	0.10	0.22	0.23
Fiji	E	Own	1.2	1.5	1.2	n.a.	n.a.	n.a.	0.01	0.00	0.01	0.01
Hong Kong	A	Consensus	available	available	1.7	WIID	2011	47.5	0.38	0.34	0.10	0.09
Indonesia	E	OECD	4.3	5.3	1.9	PovcalNet	2010	35.6	2.35	3.40	3.56	3.54
Kiribati	E	IMF/WB	0.5	1.9	1.3	n.a.	n.a.	n.a.	0.00	0.00	0.00	0.00
Laos	E	IMF/WB	5.1	6.6	2.6	PovcalNet	2012	36.2	0.03	0.06	0.10	0.11
Malaysia	E	Consensus	available	available	1.9	PovcalNet	2009	46.2	0.68	0.90	0.42	0.45
Marshall Islands	E	Own	1.1	1.7	1.1	n.a.	n.a.	n.a.	0.00	0.00	0.00	0.00
Micronesia	E	Own	1.0	1.9	1.0	n.a.	n.a.	n.a.	0.00	0.00	0.00	0.00
Mongolia	E	IMF/WB	5.3	6.2	2.6	PovcalNet	2008	36.5	0.03	0.05	0.04	0.04
Palau	E	Own	1.1	2.1	1.1	n.a.	n.a.	n.a.	0.00	0.00	0.00	0.00
Papua New Guinea	E	IMF/WB	2.5	4.3	1.0	PovcalNet	1996	50.9	0.02	0.02	0.10	0.13
Philippines	E	Consensus	available	available	1.7	PovcalNet	2012	43.0	0.63	0.97	1.40	1.59
Samoa	E	IMF/WB	1.8	2.5	1.6	n.a.	n.a.	n.a.	0.00	0.00	0.00	0.00
Singapore	A	Consensus	available	available	2.0	WIID	2012	47.8	0.42	0.43	0.08	0.08
Solomon Islands	E	IMF/WB	1.4	3.2	0.8	n.a.	n.a.	n.a.	0.00	0.00	0.01	0.01
Taiwan	A	Consensus	available	available	n.a.	LIS	2010	33.3	0.96	0.83	0.33	0.27
Thailand	E	Consensus	available	available	1.8	PovcalNet	2010	39.4	0.95	1.04	0.96	0.78
Timor-Leste	E	IMF/WB	2.7	4.6	2.9	PovcalNet	2007	30.4	0.00	0.00	0.02	0.02
Tonga	E	IMF/WB	1.0	1.8	1.3	n.a.	n.a.	n.a.	0.00	0.00	0.00	0.00
Tuvalu	E	Own	1.4	1.9	1.4	n.a.	n.a.	n.a.	0.00	0.00	0.00	0.00
Vanuatu	E	IMF/WB	1.8	3.8	1.1	n.a.	n.a.	n.a.	0.00	0.00	0.00	0.00
Viet Nam	E	IMF/WB	6.7	7.2	2.7	PovcalNet	2010	42.3	0.48	1.04	1.31	1.21
South Asia												
Afghanistan	E	IMF/WB	2.4	4.5		WIID	2007	29.0	0.06	0.07	0.44	0.55
Bangladesh	E	IMF/WB	5.4	6.4	2.2	PovcalNet	2010	32.1	0.39	0.72	2.23	2.23
Bhutan	E	IMF/WB	4.9	5.9	2.7	n.a.	n.a.	n.a.	0.01	0.01	0.01	0.01
Maldives	E	IMF/WB	2.8	4.1	2.4	n.a.	n.a.	n.a.	0.00	0.00	0.00	0.01
Nepal	E	IMF/WB	3.0	4.0	1.7	PovcalNet	2010	32.8	0.06	0.07	0.40	0.40
Pakistan	E	Own	1.5	2.8	1.5	PovcalNet	2011	29.6	0.84	0.73	2.60	2.85
Sri Lanka	E	Own	2.4	2.9	2.4	PovcalNet	2010	36.4	0.20	0.18	0.30	0.28
MENA												
Algeria	E	Own	1.4	2.6	1.4	PovcalNet	1995	35.3	0.51	0.42	0.56	0.59
Bahrain	E	Own	0.8	1.9	0.8	n.a.	n.a.	n.a.	0.06	0.04	0.02	0.02

(continues)

Djibouti	E	IMF/WB	4.7	5.9	1.1	n.a.	n.a.	n.a.	0.00	0.00	0.01	0.01
Egypt	E	Own	1.8	3.1	1.8	LIS	2012	52.2	0.89	0.82	1.17	1.26
Iran	E	Own	1.6	2.5	1.6	PovcalNet	2005	38.3	1.19	0.97	1.10	1.10
Iraq	E	Own	3.6	6.0	3.6	PovcalNet	2012	29.5	0.50	0.85	0.48	0.66
Jordan	E	Own	1.6	3.1	1.6	PovcalNet	2010	33.7	0.08	0.08	0.10	0.12
Lebanon	E	Own	1.5	1.9	1.5	WIID	2004	37.0	0.08	0.06	0.07	0.06
Libya	E	Own	0.9	1.9	0.9	n.a.	n.a.	n.a.	0.13	0.09	0.09	0.09
Morocco	E	Own	1.8	2.8	1.8	PovcalNet	2007	40.9	0.23	0.20	0.47	0.47
Oman	E	Own	1.4	2.8	1.4	n.a.	n.a.	n.a.	0.16	0.14	0.05	0.06
Qatar	E	Own	1.6	2.8	1.6	n.a.	n.a.	n.a.	0.28	0.24	0.03	0.03
Saudi Arabia	E	Own	1.5	2.6	1.5	n.a.	n.a.	n.a.	1.52	1.26	0.41	0.43
Tunisia	E	Own	1.9	2.6	1.9	PovcalNet	2010	35.8	0.12	0.10	0.16	0.15
United Arab Emirates	E	Own	-0.2	1.4	-0.2	n.a.	n.a.	n.a.	0.54	0.34	0.13	0.15
Yemen, Republic of	E	IMF/WB	2.5	4.3	1.0	PovcalNet	2005	35.9	0.10	0.11	0.35	0.43
Sub-Saharan Africa												
Angola	E	Own	2.6	5.5	2.6	PovcalNet	2009	42.7	0.16	0.24	0.31	0.46
Benin	E	IMF/WB	2.5	4.9	1.2	PovcalNet	2012	43.5	0.02	0.02	0.15	0.20
Botswana	E	Own	1.9	2.8	1.9	PovcalNet	2009	60.5	0.03	0.03	0.03	0.03
Burkina Faso	E	IMF/WB	3.6	6.3	1.9	PovcalNet	2009	39.8	0.03	0.05	0.24	0.35
Burundi	E	IMF/WB	3.1	6.0	0.4	PovcalNet	2006	33.3	0.01	0.01	0.14	0.22
Cabo Verde	E	IMF/WB	4.7	5.5	3.0	n.a.	n.a.	n.a.	0.00	0.00	0.01	0.01
Cameroon	E	IMF/WB	2.4	4.8	1.2	PovcalNet	2007	40.7	0.06	0.08	0.32	0.43
Central African Republic	E	IMF/WB	4.4	6.3	0.6	PovcalNet	2008	56.3	0.00	0.00	0.07	0.08
Chad	E	IMF/WB	1.2	4.1	2.1	PovcalNet	2011	43.3	0.03	0.03	0.18	0.28
Comoros	E	IMF/WB	2.3	4.5	0.6	n.a.	n.a.	n.a.	0.00	0.00	0.01	0.01
Congo, Dem. Rep. of	E	IMF/WB	2.0	4.5	0.7	PovcalNet	2006	44.4	0.05	0.06	0.96	1.36
Congo, Republic of	E	IMF/WB	1.7	4.2	1.0	PovcalNet	2011	40.2	0.03	0.03	0.06	0.09
Cote d'Ivoire	E	IMF/WB	3.6	5.8	0.9	PovcalNet	2008	43.2	0.06	0.10	0.29	0.38
Equatorial Guinea	E	Own	6.3	8.8	6.3	n.a.	n.a.	n.a.	0.03	0.08	0.01	0.01
Eritrea	E	IMF/WB	0.2	2.7	0.8	n.a.	n.a.	n.a.	0.01	0.01	0.09	0.13
Ethiopia	E	IMF/WB	4.4	6.7	2.3	PovcalNet	2011	33.6	0.13	0.24	1.34	1.76
Gabon	E	Own	0.8	2.9	0.8	PovcalNet	2005	42.2	0.03	0.03	0.02	0.03
Gambia	E	IMF/WB	3.0	6.0	1.0	PovcalNet	2003	47.3	0.00	0.01	0.03	0.04
Ghana	E	IMF/WB	3.6	5.5	2.0	PovcalNet	2006	42.8	0.10	0.15	0.37	0.44
Guinea	E	IMF/WB	3.8	6.1	1.1	PovcalNet	2012	33.7	0.01	0.02	0.17	0.22
Guinea-Bissau	E	IMF/WB	2.3	4.5	0.4	PovcalNet	2002	35.5	0.00	0.00	0.02	0.03
Kenya	E	IMF/WB	3.6	6.1	1.1	PovcalNet	2005	47.7	0.10	0.17	0.63	0.86
Lesotho	E	IMF/WB	4.1	5.0	1.8	PovcalNet	2010	54.2	0.01	0.01	0.03	0.03
Liberia	E	IMF/WB	3.5	5.9	3.4	PovcalNet	2007	38.2	0.00	0.01	0.06	0.08
Madagascar	E	IMF/WB	3.8	6.5	0.7	PovcalNet	2010	40.6	0.03	0.06	0.33	0.47
Malawi	E	IMF/WB	3.1	5.8	1.3	PovcalNet	2010	46.2	0.01	0.02	0.23	0.34

(continues)

APPENDIX C DATA SOURCES, GROWTH, AND POPULATION PROJECTIONS FOR INDIVIDUAL COUNTRIES *(continued)*

Mali	E	IMF/WB	1.8	5.0	1.5	PovcalNet	2010	33.0	0.02	0.03	0.22	0.35
Mauritania	E	IMF/WB	2.4	4.6	1.3	PovcalNet	2008	40.5	0.01	0.01	0.06	0.07
Mauritius	E	Own	2.0	2.2	2.0	PovcalNet	2012	35.9	0.02	0.02	0.02	0.02
Mozambique	E	IMF/WB	6.0	8.5	2.3	PovcalNet	2009	45.7	0.03	0.08	0.37	0.51
Namibia	E	Own	1.6	3.2	1.6	PovcalNet	2010	61.3	0.02	0.02	0.03	0.04
Niger	E	IMF/WB	2.2	6.2	1.0	PovcalNet	2011	31.2	0.02	0.03	0.25	0.49
Nigeria	E	IMF/WB	4.3	7.1	2.0	PovcalNet	2010	43.0	0.96	2.01	2.47	3.62
Rwanda	E	IMF/WB	4.1	6.6	1.5	PovcalNet	2011	50.8	0.02	0.03	0.17	0.23
Sao Tome and Principe	E	IMF/WB	4.2	6.4	2.0	n.a.	n.a.	n.a.	0.00	0.00	0.00	0.00
Senegal	E	IMF/WB	2.7	5.3	1.2	PovcalNet	2011	40.3	0.03	0.05	0.20	0.29
Seychelles	E	Own	1.5	1.8	1.5	n.a.	n.a.	n.a.	0.00	0.00	0.00	0.00
Sierra Leone	E	IMF/WB	4.0	5.6	1.7	PovcalNet	2011	35.4	0.01	0.02	0.09	0.10
South Africa	E	OECD	3.9	4.5	1.3	LIS	2010	66.6	0.65	0.80	0.75	0.70
Sudan	E	IMF/WB	2.2	4.4	1.7	PovcalNet	2009	35.3	0.13	0.15	0.54	0.71
Swaziland	E	Own	1.2	2.3	1.2	PovcalNet	2010	51.5	0.01	0.01	0.02	0.02
Tanzania	E	IMF/WB	4.5	7.4	1.8	PovcalNet	2012	37.8	0.09	0.19	0.70	1.06
Togo	E	IMF/WB	1.9	4.2	1.3	PovcalNet	2011	46.0	0.01	0.01	0.10	0.13
Trinidad and Tobago	E	Own	2.3	2.0	2.3	n.a.	n.a.	n.a.	0.04	0.03	0.02	0.01
Uganda	E	IMF/WB	3.8	7.0	2.0	PovcalNet	2013	44.6	0.05	0.11	0.54	0.85
Zambia	E	IMF/WB	3.7	7.0	1.2	PovcalNet	2010	57.5	0.05	0.10	0.21	0.34
Zimbabwe	E	IMF/WB	1.2	3.2	0.3	WIID	2011	42.3	0.02	0.02	0.20	0.25
Eastern Europe & Central Asia												
Albania	E	Own	2.9	3.1	2.9	PovcalNet	2012	29.0	0.03	0.03	0.05	0.04
Armenia	E	IMF/WB	4.3	4.3	3.3	PovcalNet	2012	30.3	0.02	0.03	0.04	0.03
Azerbaijan	E	Own	3.0	3.5	3.0	PovcalNet	2008	33.0	0.16	0.16	0.13	0.12
Belarus	E	Own	2.5	1.9	2.5	PovcalNet	2011	26.5	0.16	0.11	0.13	0.10
Bosnia and Herzegovina	E	Own	2.2	1.9	2.2	PovcalNet	2007	33.0	0.04	0.03	0.05	0.04
Georgia	E	IMF/WB	5.6	5.0	2.7	PovcalNet	2012	41.4	0.03	0.04	0.06	0.04
Kazakhstan	E	Own	2.3	3.0	2.3	PovcalNet	2010	28.6	0.38	0.34	0.23	0.22
Kyrgyz Republic	E	IMF/WB	3.8	5.0	1.4	PovcalNet	2011	33.4	0.02	0.02	0.08	0.08
Macedonia	E	Own	1.5	1.3	1.5	PovcalNet	2008	44.2	0.03	0.02	0.03	0.02
Moldova	E	IMF/WB	5.8	5.0	1.2	PovcalNet	2011	30.6	0.02	0.02	0.05	0.03
Montenegro	E	Own	2.3	2.1	2.3	n.a.	n.a.	n.a.	0.01	0.01	0.01	0.01
Russia	E	OECD	3.1	2.7	1.7	LIS	2010	35.2	3.42	2.86	2.04	1.52
Serbia	E	Own	2.0	1.3	2.0	LIS	2013	34.3	0.12	0.07	0.14	0.10
Tajikistan	E	IMF/WB	3.1	5.0	1.3	PovcalNet	2009	30.8	0.02	0.03	0.12	0.14
Turkmenistan	E	Own	2.2	3.0	2.2	n.a.	n.a.	n.a.	0.07	0.07	0.07	0.07
Ukraine	E	Consensus	available	available	1.1	PovcalNet	2010	24.8	0.39	0.35	0.64	0.45
Uzbekistan	E	Own	2.1	3.0	2.1	PovcalNet	2003	35.2	0.15	0.13	0.41	0.41

LIS = Luxembourg Income Study; MENA = Middle East and North Africa; n.a. = not available; WIID = World Income Inequality Database

Note: The table summarizes the regional and economic classification of all countries, including those for which income inequality data are not available or are not used because the countries are too small for these data to be relevant. All countries are listed here for completeness, but the bulk of our analysis uses the subsample of the 141 countries with inequality data. Advanced countries follow the definition in the International Monetary Fund's *World Economic Outlook*. The regional classification is broadly based on World Bank publications. The third column lists the source of growth projections (all November 2014 vintages) as OECD ("Looking into 2060"), Consensus Forecasts, IMF/World Bank teams (see Ho and Mauro 2014), or own projections using a simple autoregression as explained in the text. The fourth and fifth columns show baseline (annual) growth projections from 2014 to 2035 for per capita GDP and total GDP, respectively. Consensus Forecasts are not shown because the data are proprietary. The sixth column shows the more pessimistic growth scenarios, as described in the text in section IV. In that column, the alternative growth rates for Croatia, Haiti, Maldives, Timor-Leste, Libya, Qatar, Iraq, Sao Tome and Principe, Bosnia and Herzegovina, and Montenegro are projected based on 10-year horizons. For the remainder, growth rates are projected based on a 20-year horizon. The seventh and eighth columns list the inequality data source and the year of data collection. Gini coefficient follows to the right. Finally, GDP and population shares relative to the rest of the world at present and in 2035 (projected) are shown in the last four columns.

APPENDIX D COVERAGE OF THE SAMPLE FOR CONSUMPTION REGRESSIONS

Afghanistan	Brazil, Rio Grande do Sul	Honduras	India, Rajasthan	Morocco	Tajikistan
Albania	Brazil, Rio de Janeiro	India	India, Sikkim	Mozambique	Tanzania
Armenia	Brazil, Rondonia	India, Andaman & Nicobar	India, Tamil Nadu	Namibia	Thailand
Azerbaijan	Brazil, Roraima	India, Andhra Pradesh	India, Tripura	Nepal	Timor Leste
Bangladesh	Brazil, Santa Catarina	India, Arunachal Pradesh	India, Uttar Pradesh	Nicaragua	Togo
Belarus	Brazil, Sao Paolo	India, Assam	India, Uttaranchal	Niger	Turkey
Benin	Brazil, Sergipe	India, Bihar	India, West Bengal	Nigeria	Uganda
Bhutan	Brazil, Tocatins	India, Chandigarh	Indonesia	Pakistan	Ukraine
Bolivia	Bulgaria	India, Chhattisgarh	Iraq	Papua New Guinea	Vietnam
Bosnia and Herzegovina	Burkina Faso	India, Dadra and Nagar Haveli	Jamaica	Peru	Yemen
Brazil	Burundi	India, Daman and Diu	Jordan	Philippines	Zambia
Brazil, ACR	Cabo Verde	India, Delhi	Kazakhstan	Romania	
Brazil, Alagoas	Cambodia	India, Goa	Kenya	Russian Federation	
Brazil, Amapa	Cameroon	India, Gujarat	Kyrgyz Republic	Rwanda	
Brazil, Amazonas	Chad	India, Haryana	Laos	Sao Tome and Principe	
Brazil, Bahia	China	India, Himachal Pradesh	Latvia	Senegal	
Brazil, Ceara	Colombia	India, Jammu and Kashmir	Lesotho	Serbia	
Brazil, Distrito Federal	Congo, Dem. Rep. of	India, Jharkhand	Liberia	Sierra Leone	
Brazil, Espirito Santo	Congo, Republic of	India, Karnataka	Lithuania	South Africa	
Brazil, Goias	Cote d'Ivoire	India, Kerala	Macedonia	South Africa, Eastern Cape	
Brazil, Maranhao	Djibouti	India, Lakshadweep	Madagascar	South Africa, Free State	
Brazil, Mato Grosso	Egypt	India, Madhya Pradesh	Malawi	South Africa, Gauteng	
Brazil, Mato Grosso do Sul	El Salvador	India, Maharashtra	Maldives	South Africa, Kwazulu Natal	
Brazil, Minas Gerais	Ethiopia	India, Manipur	Mali	South Africa, Limpopo	
Brazil, Para	Fiji	India, Meghalaya	Mauritania	South Africa, Mpulamanga	
Brazil, Paraiba	Gabon	India, Mizoram	Mauritius	South Africa, North West	
Brazil, Paran	Gambia, The	India, Nagaland	Mexico	South Africa, Northern Cape	
Brazil, Pernambuco	Ghana	India, Orissa	Moldova	South Africa, Western Cape	
Brazil, Piaji	Guatemala	India, Pondicherry	Mongolia	Sri Lanka	
Brazil, Rio Grande do Norte	Guinea	India, Punjab	Montenegro	Swaziland	