

### POVERTY, GROWTH AND INEQUALITY OVER THE NEXT 50 YEARS

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Global poverty has fallen dramatically over the last two centuries, and the fall has intensified in recent decades, raising hopes that poverty could be eliminated within the next 50 years. After industrialization, specialization and trade increased economic growth and living standards in Western Europe and the European offshoots in the nineteenth century, much of the rest of the world also started growing rapidly after 1950.

Poverty reduction, however, has been very uneven across countries. Since 1980, China alone has accounted for most of the world's decline in extreme poverty. Even though there has been a huge rise in income inequality within China, economic growth has been so strong that hundreds of millions of people have risen out of extreme poverty and the poverty ratio has plummeted. Sub-Saharan Africa, at the other extreme, has seen its poverty headcount continue to rise; the negative impact of low economic growth has far outweighed modest improvements in within-country income inequality.

Strong economic growth is the key to future poverty reduction. If the lagging non-OECD<sup>2</sup> countries are able to transition to a sustainable higher growth path, the global poverty ratio will fall from about 21 percent in 2005 to less than 2.5 percent in 2050, and the number of people living in absolute poverty will decline by another billion. Although the historical record is clear that market-friendly policies and competent governance are critical to growth, few economists are bold enough to claim they know the precise combination of policies, and how to implement and sustain these policies to achieve such an economic transition.

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1. This research received support through a grant from FAO for the How to Feed the World in 2050 project. Parts of this chapter represent a revision and extension of a previous paper by the author (Hillebrand, 2008).

2. For simplicity, this chapter divides countries into two groups: the OECD countries as of 1981 (Austria, Australia, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Japan, Luxembourg, Portugal, New Zealand, the Netherlands, Norway, Spain, Sweden, Switzerland, the United Kingdom and the United States of America); and the non-OECD countries as of the same year (although some of these countries are now part of OECD).

Forecasts of future economic growth rates and poverty rates are necessarily speculative and depend on a large number of assumptions about human behaviour and policy decisions that are impossible to know in advance. This chapter reviews the poverty estimates available in the literature, analyses the changes behind the trends, and models poverty trends to 2050.

### **Poverty measurement**

Before modern economic growth took off in a few Western Europe countries, a few European offshoots and Japan – a group of countries hereafter referred to as OECD – living standards in all countries were very low on average, by modern standards. Maddison (2003) estimated OECD gross domestic product (GDP) per capita in 1820 at about USD 1 571 in 2005 purchasing power parity (PPP) dollars versus an average of USD 730 in non-OECD countries.<sup>3</sup> Rising economic growth in OECD countries over the following century increased incomes and cut poverty dramatically, leaving the non-OECD countries far behind. Bourguignon and Morrisson (2002) attempted to combine measures of income distribution within countries with cross-country GDP measures, to obtain a measure of the global distribution of income and a global measure of poverty. Their paper tells a dramatic and straightforward story: global poverty rates have fallen sharply, from 85.2 percent in 1820 to 31.3 percent in 1980, as economic growth everywhere far outpaced population growth. However, these authors also show that the global distribution of income became much more unequal. Global inequality was high in 1820 (with a Gini coefficient of 0.50) and rose over the next 160 years, to reach 0.658 in 1980. In the early nineteenth century, most inequality was due to differences within countries, but most of the rise in equality since 1820 has been due to differences in growth rates among countries. Economic growth per capita in the OECD countries was twice as fast as in the non-OECD countries from 1820 to 1980. The figures shown in Table 4.1 present an introduction to the historical data on growth and poverty, based mainly on the work of Maddison (2001) and Bourguignon and Morrisson (2002), on recently updated work on poverty by Chen and Ravallion (2008), and on long-run poverty forecasts that will be discussed in this chapter.

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3. Maddison actually estimated USD 1 109 and USD 578 in 1990 PPP prices but all his figures have been revised into 2005 prices in this chapter. To compare GDP and living standards across countries at widely different levels of development, economists usually prefer to use PPP ratios (among all currencies), which seek to estimate how much of any given currency will be required to buy an equivalent amount of the same quantity and quality of goods in any country. The International Comparison Project (ICP) undertakes a massive international survey every few years to create new estimates of these PPP ratios at a given point in time (see World Bank, 2008 for details).

**Table 4.1**  
**Long-run estimates of growth and poverty**

Region	1820	1950	1980	1981	2005	Alternative forecasts		
						Market first	Trend growth	
							2050	
<i>World</i>								
GDP (billion 2005 PPP USD)	913	7 006		26 825	56 593	309 569	193 318	
Population (millions of people)	1 041	2 525		4 511	6 458	9 301	9 301	
GDP per capita (2005 PPP USD/year)	876	2 775		5 947	8 764	33 285	20 785	
average annual change <sup>a</sup> (%)		0.9		2.5	1.6	3.0	1.9	
Absolute poverty headcount (millions)	887	1 376	1 390	1 896	1 377	245	1 120	
Absolute poverty ratio (%)	85.2	54.5	31.3	42.0	21.3	2.6	12.0	
Inequality index (Gini coefficient) <sup>b</sup>	0.50	0.640	0.658	0.709	0.684	0.648	0.679	
<i>Non-OECD</i>								
GDP (billions of 2005 PPP USD)	628	2 702		11 324	26 008	189 980	112 177	
Population (millions of people)	860	1 947		3 744	5 561	8 310	8 310	
GDP per capita (2005 PPP USD/year)	730	1 388		3 024	4 677	22 861	13 498	
average annual change (%)		0.5		2.5	1.8	3.6	2.4	
Absolute poverty headcount				1 896	1 377	245	1 120	
Absolute poverty ratio (% of non-OECD population)				50.6	24.8	2.9	13.5	
<i>OECD</i>								
GDP (billions of 2005 PPP USD)	284	4 304		15 501	30 585	119 589	81 142	
Population (millions of people)	181	578		767	897	990	990	
GDP per capita (2005 PPP USD/year)	1 571	7 446		20 222	34 089	120 756	81 933	
average annual change (%)		1.2		3.3	2.2	2.9	2.0	

<sup>a</sup> Average annual growth rates are calculated for 1821 to 1950, 1981 to 2005, and 2006 to 2050.

<sup>b</sup> The Gini coefficient is calculated on an individual basis: it uses information on within-country income distribution.

Sources: GDP and population for 1981 to 2005 from World Development Indicators; early years linked from Maddison, 2001; poverty headcount and ratios for 1981 to 2005 from Chen and Ravallion, 2008; for 1820 to 1980 from Bourguignon and Morrisson, 2002.

Although the poverty ratio was falling, the number of people living in absolute poverty – measured at the USD 1.25 a day standard in PPP dollars<sup>4</sup> –

4. The new standard is USD 1.25 a day, measured in 2005 PPP dollars. Previous measures of absolute poverty were USD 1 a day using 1985 price levels and USD 1.08 using 1993 price levels. Although this chapter uses USD 1.25 or USD 2.50 a day as poverty threshold figures, it should be understood that these figures are consistent with earlier literature using the USD 1 a day standard.

kept growing, from fewer than 900 million in 1820 to almost 1.4 billion in 1980 (Bourguignon and Morrisson, 2002)<sup>5</sup>.

Subsequent work by Bhalla (2002), Sala-i-Martin (2002), Chen and Ravallion (2004) and Hillebrand (2008) extended the analysis from 1980 and found a pronounced downwards trend in poverty headcounts and poverty ratios, mainly because of very rapid economic growth in China and India. The conclusions on global inequality are more mixed. Bhalla (2002), Sala-i-Martin (2002) and Bourguignon and Morrisson (2002) show a downwards trend in global income inequality from 1980, while Milanovic (2005) and Hillebrand (2008) show little trend, at least until the late 1990s or early 2000s.

Poverty estimates made prior to late 2008 have been thrown into doubt by the release of new PPP estimates from the International Comparison Project (ICP). This new study is based on a much more complete global survey of prices (including China for the first time) and presumably gives a far more accurate measure for gauging cross-country differences in income and consumption (Heston, 2008). The major impact of this new work is that price levels for most non-OECD economies have been revised upwards, meaning that income, production and consumption levels have been revised sharply downwards, especially for China and India (Table 4.2).

**Table 4.2**  
**New and old estimates of per capita GDP in 2005**

Country	2005	2005	2005	2005
	ICP	WDI	PWT63	Exchange rate
	<i>(USD in 2005 prices)</i>			
China	4 091	6 760	6 637	1 721
India	2 126	3 452	3 536	707
Japan	30 290	30 736	27 726	35 604
United States	41 674	41 674	41 674	41 674

WDI = World Development Indicators the World Bank database; PWT63 = Penn World Tables version 63.

Source: Heston, 2008.

A new paper by Chen and Ravallion (2008) uses the 2005 ICP PPP estimates to create new estimates of global poverty for 1981 to 2005 that are hundreds of

5. To study incomes and poverty over time, the producers of the commonly used global economic databases – the World Bank (World Development Indicators database), Angus Maddison (2003) and the Penn World Tables (PWT) – start with PPP GDP estimates for every country at a given point in time, and then estimate past and future PPP GDP based on national income account data. This methodology has severe theoretical drawbacks, especially the implicit assumption that the PPP ratio between currencies is constant. Efforts to replace this methodology have been considered by Dowrick and Akmal (2005) and Feenstra and Rao (2008), among others, but their ideas have not yet been adopted by the global database producers.

millions of people higher than the authors' own previous calculations or other estimates appearing in the literature<sup>6</sup> (Table 4.3). The new Chen/Ravallion poverty numbers, while pointing in a direction consistent with the revisions of GDP per capita shown in Table 4.1, raise numerous questions of their own: Has the calculated fall in Chinese poverty really been so dramatic? Heston (2008) asserts that the implied Chinese growth going very far back is implausible. Has the fall in Indian poverty really been so small compared with Bhalla's calculations? Bhalla (2002) asserts that the household surveys underpinning the Chen/Ravallion poverty estimates badly underestimate total Indian consumption. Why are the implicit aggregate consumption figures for many countries so different from national income account figures? The aggregate consumption share figure falls dramatically in both China and India, leading to far higher estimates of poverty than consumption figures from the national accounts would suggest. Some of these questions may be answered when more details of ICP 2005 are released and when Penn World Tables (PWT) completes its analysis of the data; others will probably linger indefinitely owing to disagreements over data and methodology.

**Table 4.3**  
**New and old poverty estimates in 2005**

<i>Country/region</i>	Chen/Ravallion 2008	WDI 2007	Hillebrand 2008
	<i>(millions of people)</i>		
China	208	77	131
India	456		163
Sub-Saharan Africa	391		427
World	1377	977	965

*Sources:* Chen and Ravallion, 2008; Hillebrand, 2008. The WDI numbers are World Bank updates of the Chen and Ravallion, 2004 calculations for 2001.

In any case, all poverty figures are estimates, based on imperfect data and on many different, challengeable assumptions about how to put the data together to come up with global inequality measures and poverty headcounts. For now, the Chen/Ravallion figures are the most up-to-date and comprehensive estimates available. The poverty numbers in the Chen and Ravallion 2008 paper, and the underlying

6. The data revision, and not changed economic circumstances, accounts for the huge jump in the number of people living in absolute poverty in 1981 as estimated by Chen and Ravallion compared with in 1980, as estimated by Bourguignon and Morrisson (2002). The new price data will presumably cause the 1820 to 1980 poverty estimates to be revised upwards too, but this work has not yet been done.

estimates for 119 countries made available through the World Bank's Povcal website<sup>7</sup> constitute the starting point for this chapter's estimates of poverty to 2050.

### **Explaining changes in poverty, 1981 to 2005**

World poverty fell dramatically between 1981 and 2005, according to estimates by all the sources cited in the previous section, including the latest Chen and Ravallion (2008) work. All sources also agree that most, if not all of the gains were due to huge decreases in the Chinese poverty headcount. According to Chen and Ravallion (2008) the world absolute poverty headcount declined by more than 500 million people from 1981 to 2005,<sup>8</sup> and the world poverty headcount ratio fell from 42 to 21.3 percent (Table 4.4). The poverty headcount in China alone, however, fell by more than 600 million people. In only 24 years, China went from having 84 percent of its people living below the USD 1.25 a day absolute poverty level to having less than 17 percent of its people impoverished. Some other large countries (Brazil, India, Indonesia, Mexico, Pakistan, South Africa and Viet Nam) also showed dramatic reductions in the poverty ratio and, sometimes, the poverty headcount.<sup>9</sup>

Sub-Saharan Africa, on the other hand, saw a huge increase in the number of people living in absolute poverty and only a small decrease in the poverty ratio. Only four (out of 42) sub-Saharan African countries (Cape Verde, Mauritania, Senegal and South Africa) recorded falls in poverty headcounts, while a dozen countries recorded increases in poverty headcount ratios, and a few (the Democratic Republic of the Congo, Nigeria and the United Republic of Tanzania) showed tens of millions more people living in absolute poverty in 2005 than in 1981. However, faster economic growth in the last decade has led to a slight decline in the sub-Saharan Africa poverty ratios since 1996 (Figure 4.1).

Changes in the poverty headcount of any country can be ascribed to one of three factors: aggregate per capita economic growth; changes in the share of aggregate GDP going to private consumption versus the other components of GDP;<sup>10</sup> and distribution of consumption among individuals within the country.<sup>11</sup> For example,

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7. <http://web.worldbank.org/wbsite/external/extdec/extresearch/extprograms/extpovres/extpovcal/net/0,,contentmdk:21867101~pagepk:64168427~pipk:64168435~thesitepk:5280443,00.html>.

8. From this point onwards, all historical poverty figures (i.e., prior to and including 2005) included in this chapter are taken from Chen and Ravallion (2008) or from the World Bank's Povcal website, which contains more details than included in the 2008 paper.

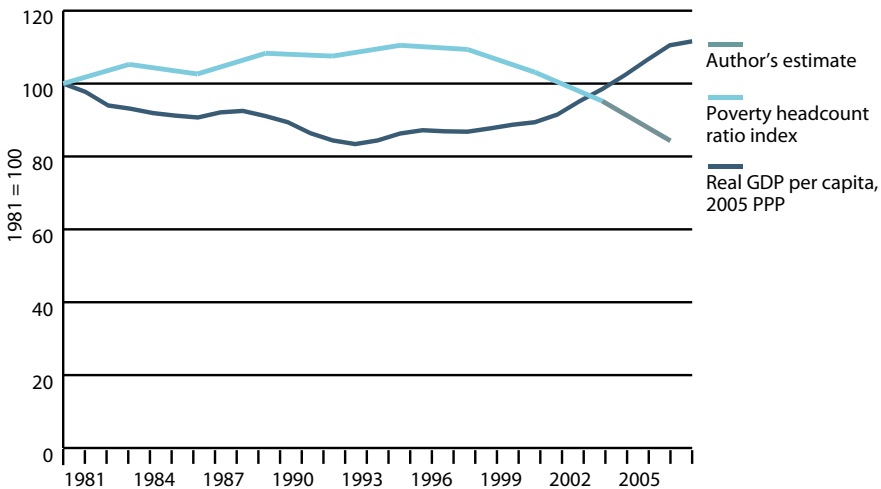
9. Results for all countries, both historical and forecast, are available from the author.

10. Results for all countries, both historical and forecast, are available from the author.

11. Measured by estimated Lorenz curves and the standard accounting procedure (SAP) methodology.

if the share of GDP going to consumption remained the same in 2005 as in 1981, and the distribution shares across the population remained the same, all the differences in poverty levels could be explained by changes in economic growth.

**Figure 4.1**  
Trends in GDP per capita and poverty headcount ratio, sub-Saharan Africa



Sources: Poverty headcount ratio from Chen and Ravallion, 2008; estimate for 2008 by author; GDP per capita from World Development Indicators.

Economic growth in non-OECD countries overdetermines the estimated fall in poverty headcounts (Table 4.4). Had Lorenz curves<sup>12</sup> and consumption ratios remained constant, the world poverty headcount would have fallen from 1 896 million people in 1981 to 791 million in 2005, and not the 1 377 million people estimated by Chen and Ravallion. Declines in the aggregate consumption ratio and shifts in distribution combined to increase the poverty headcount by almost 600 million people from what it would have been if aggregate and by-person distribution had remained at 1981 levels.

12. The Lorenz curve is a widely used technique for showing inequality in income (or any other quantity distributed across a population). It shows the cumulative shares of income held by cumulative shares of the population. If income is distributed evenly, each 10 percent of the population gets 10 percent of the total income, and the curve is a straight line with a 45 percent slope. The more unequal the distribution, the greater the bow in the curve to the right of the 45 percent line. The Gini coefficient is a summary statistic that measures the area between the 45 percent line and the Lorenz curve. In principle, Gini coefficients range between 0 (perfect equality of income) and 1.0 (perfect inequality – one person in the population gets all the money). In practice, GDP per capita or consumption per capita Gini coefficients range from the mid-0.20s (in some Scandinavian countries) to the 0.60s and 0.70s (in some African countries).

**Table 4.4**  
**World poverty headcounts and poverty ratios**

<i>Region/country</i>	<i>Headcount (millions)</i>		<i>Ratio (%)</i>	
	1981	2005	1981	2005
World	1 896	1 377	42.0	21.3
East Asia	1 072	316	77.7	16.8
China	835	208	84.0	15.9
Indonesia	108	47	71.5	21.4
Viet Nam	49	19	90.4	22.8
South Asia	548	596	59.4	40.3
India	421	456	59.8	41.7
Pakistan	62	35	72.9	22.6
Latin America	42	46	11.5	8.4
Brazil	21	14	17.1	8
Mexico	6.8	2	9.8	1.7
Sub-Saharan Africa	214	391	53.7	51.2
Congo, Dem. Rep.	9	35	31.9	59.2
Nigeria	35	88	47.2	62.4
South Africa	10	10	34.9	20.6
East Europe and Central Asia	7	17	1.7	3.7
Near East/North Africa	14	11	7.9	3.6

Source: Chen and Ravallion, 2008, with world headcount divided by world population.

Although China started with an extremely high rate of absolute poverty, its rate of real per capita economic growth was so high (8.8 percent a year)<sup>13</sup> that even the estimated consumption of the lowest 10 percent of the population would by 2005 have far surpassed the USD 1.25 a day per person absolute poverty standard if the overall amount of GDP going to consumption had not dropped sharply and the inequality of distribution of that total amount of consumption had not increased sharply.<sup>14</sup> Poverty headcounts were also down in most other East Asian countries. Indonesia and Viet Nam cut their poverty headcounts sharply by combining strong economic growth without adversely affecting consumption ratios. The Philippines was the worst performer in the East Asian region: the poverty headcount went up by 3.7 million people, mainly because of low economic growth.

13. 1982 to 2005, see World Development Indicators database, 2009, using GDP per capita in 2005 PPP dollars.

14. The World Income Inequality Database suggests that aggregate Chinese Gini coefficient rose about 15 points, from 0.29 to 0.44, over this period, while the Indian Gini coefficient rose about 4 points, from 0.32 to 0.36. [www.wider.unu.edu/research/database/en\\_gb/database/](http://www.wider.unu.edu/research/database/en_gb/database/).



India had high economic growth, at 3.3 percent per year, which would have been fast enough to raise 364 million people out of absolute poverty if the distribution of income and consumption had not changed so greatly. However, the ratio of aggregate consumption to GDP fell by about 20 percentage points over this period, and aggregate consumption was distributed more unevenly, with the overall Gini coefficient on household consumption rising about 4 percentage points. Pakistan performed better than India. Its poverty headcount went down and its poverty ratio dropped dramatically, from 72.9 to 22.6 percent, according to the Chen/Ravallion numbers. Its economic growth was weaker than India's, but Pakistan did not have the dramatic decline in the ratio of private consumption to GDP.

**Table 4.5**  
Impacts of economic growth and distribution shifts on poverty headcounts

Region/country	1981	2005	Total change	Change due to		
				GDP growth	shifts in aggregate consumption ratio	income distribution shifts (shifts in Lorenz curves)
	<i>(millions of people)</i>					
World	1 896	1 377	-520	-1 105	344	241
East Asia	1 072	316	-755	-957	21	181
of which China	835	208	-627	-835	38	170
South Asia	548	596	47	-389	362	75
of which India	421	456	35	-364	324	75
Sub-Saharan Africa	214	391	177	252	-63	-11
Latin America and Caribbean	41	44	3	-3	21	-15

Sources: 1981 and 2005 poverty headcounts from Chen and Ravallion, 2008; growth and distribution shifts estimated by author (sums may not total owing to rounding).

Sub-Saharan Africa had very negative results. Average real GDP growth was slower than population growth and would – without favourable distributional changes – have caused poverty headcounts to double. The worst performers were Côte d'Ivoire and the Democratic Republic of the Congo. These two conflict-torn countries had average negative GDP per capita growth of 2 and 4 percent per year, respectively. The ratio of consumption to GDP soared, but not enough to compensate for the growth effects. Nigeria also had very negative results, with the poverty headcount rising by almost 54 million people and the poverty ratio rising from 18 to 62.4 percent. Nigeria had a toxic combination of low growth in GDP per capita (0.7 percent per year), a sharp fall in the ratio of private consumption to GDP (from 42 to 28 percent) and a rise in consumption inequality (the Gini coefficient rose from 0.387 to 0.429). South Africa was one of the best performers

on the continent. It had low economic growth (-0.2 percent), but a large increase in the consumption ratio (from 43 to 53 percent) and a slight decrease in inequality (the Gini coefficient fell from 0.59 to 0.58).

Latin America has higher average incomes and less absolute poverty than Asia and sub-Saharan Africa. Because it did not have much absolute poverty to begin with in 1981, it did not take much per capita GDP growth to push more people above the poverty threshold, as long as distribution did not change adversely. Per capita real GDP growth was only 0.7 percent per year from 1981 to 2005, but the regional consumption ratio average rose by two percentage points, and the population-weighted regional Gini coefficient rose only slightly. Mexico and Brazil have made dramatic progress since 1981. Brazil brought its poverty headcount down by almost 7 million people and its poverty ratio shrank from 17 percent in 1981 to 7.8 percent in 2005. Mexico reduced its poverty headcount by 4.9 million people, while reducing its poverty ratio from 9.8 percent in 1981 to 1.7 percent in 2005. Argentina, the Plurinational State of Bolivia, Peru and Venezuela all saw sharp increases in their poverty ratios between 1981 and 2002, but both the headcounts and the poverty ratios showed large decreases between 2002 and 2005, according to the World Bank Povcal database.

### *Trends in global inequality, 1981 to 2005*

Chen and Ravallion (2008) do not report any calculations of global inequality. Hillebrand (2008) reports several different estimates of global inequality (Table 4.6). Most of these (Milanovic is the exception) use estimates of within-country income or consumption distributions and multiply these by the value of income or consumption taken from the national income accounts. For Milanovic (2005), a better measure would be to distribute the total consumption by country inferred from the household consumption surveys. Table 4.6 is based on data for the 119 countries included in the Povcal database, plus consumption figures – from various sources, but mostly using aggregate consumption data in 2005 PPP terms – for the additional 63 countries covered in the author’s database, and used Bhalla’s (2002) SAP to calculate world Gini coefficients, which fell slightly from 1981 to 2005, mainly because of strong economic growth in Asia.<sup>15</sup>

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15. Using the 2005 ICP, Milanovic (2008) also revised upwards his estimate of global inequality. His new estimate for the global Gini coefficient in 2002 is 0.699 compared with a previous estimate of 0.653.

**Table 4.6**  
**Estimates of world Gini coefficients**

	1820	1970	1980	1981	1988	1992	1993	1998	2005
Bourguignon/Morrisson	0.50	0.65	0.657			0.657			
Bhalla			0.686			0.678		0.654	
Sala-i-Martin			0.662			0.645		0.633	
Milanovic					0.619		0.652	0.642	
Hillebrand			0.653						0.634
2009 estimate using 2005 ICP data				0.709					0.684

Sources: Bourguignon and Morrisson, 2002; Bhalla, 2002; Sala-i-Martin, 2002; Milanovic, 2005; Hillebrand, 2008; and author's estimates.

### Forecasting economic growth

Forecasting poverty 40 years into the future is mainly a matter of forecasting economic growth. Bourguignon and Morrisson (2002) claimed that economic growth had by far the greatest impact on global poverty inequality for 1820 to 1992. Ravallion (2001) and Dollar and Kraay (2002) show that the poor, on average, tend to share proportionately in the gains from economic growth; and the previous analysis of the Chen/Ravallion poverty data set shows that economic growth far outweighed the impact of the other two proximate causes – the distribution of national output between consumption and other uses, and changes of distribution by person, in each country.

Economists have long relied on the neoclassical growth model (Solow, 1956) to think about economic growth. In Solow's framework, economic growth depends on changes in the capital stock (machinery, buildings, roads, communication lines, etc.), changes in the labour force, and changes in technology. In this model, diminishing returns eventually set in and growth slows, unless technological change intervenes to keep productivity increasing.

According to empirical research by Abramowitz (1956) and many others, changes in technology have contributed the major part of long-run economic growth in OECD countries, and thus should be important to forecasts of the future. While changes in capital and labour are relatively simple to model and forecast, technology is not. Solow treated the technological change component as a residual or exogenous factor, not explainable by growth theory. Later researchers, especially Romer (1987; 1990), Grossman and Helpman (1991) and Barro and Sala-i-Martin (1995) have attempted to "endogenize" growth theory by trying to explain theoretically (and demonstrate empirically) the causal forces underlying technological progress, especially investment in research and development (R&D), but also institutional factors such as protection of property rights, regulation of international trade, and taxation.

An important corollary of the extended neoclassical growth model for poverty analysis is the convergence concept. It is implicit in the neoclassical growth model that poor countries should grow faster than rich countries and should eventually catch up – converge – with the latter’s per capita output and income. According to Barro (1998: 1): “If all economies were intrinsically the same except for their starting capital intensities, ... poor places would tend to grow faster per capita than rich ones.” Because rich countries are limited by diminishing returns and poor countries can grow faster by increasing capital stocks and adopting best practice technology, incomes ought eventually to converge. Lucas (2000) makes use of this convergence concept to predict rapid non-OECD growth and a convergence of incomes by 2100.

On the other hand, North (2005) believes that neoclassical economic theory by itself is not much help in explaining the process of economic change – institutions are more important. Economies are composed of institutions that provide incentives for work, trade, saving and investment, or not. Institutions that stifle competition and encourage predation might arise and persist, counter to the convergence hypothesis, because institutions poorly designed for economic growth might be well suited for maintaining the power and prosperity of those in command or be based on cultural beliefs that do not value economic growth highly. Collier (2007) warns that bad governance is only one of the four poverty traps that can keep countries down.<sup>16</sup> Olson (1982) suggests that even rich and prosperous countries that have achieved prosperity through good institutions are constantly at risk of economic sclerosis, as special interests accrue power over time, through lobbying and politics, to undermine the institutions that spur competition and investment.

Most long-run economic growth forecasts that appear in the literature are based on modelling exercises that use neoclassical and endogenous growth theory, the convergence concept and some reference to the institutional ideas of North, Olson and others. While there is much to criticize and debate in the theoretical literature, it is important to note that the empirical estimates of the underlying relationships are also contentious, with the magnitude of the relationships and even the direction of causality often in dispute. Any forecasting effort requires many assumptions about policy choices by future governments over long periods; long-run forecasting efforts are necessarily speculative.

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16. The other three are: i) conflict and political violence; ii) abundance of natural resource wealth that distorts economic growth; and iii) geographical disadvantages such as being land-locked, poor in resources or harried by bad neighbours.

## Forecasting poverty and inequality

What will global poverty look like in ten, 20 or 45 years? Not many explicit forecasts appear in the literature. Using the old ICP data, Chen and Ravallion (2004: 33) suggest global poverty will drop, but their estimate is based on two time series regressions (one each for East Asia and South Asia) based on past changes in the poverty headcount relative to assumptions about long-term economic growth. They assume that the poverty ratio in Africa will continue to be 45 percent. Their modelling and assumptions add up to a world poverty rate of 15 percent in 2015, thus meeting the Millennium Development Goals (MDGs).

Bhalla (2002) concludes that the world poverty rate has already dropped below 15 percent and will continue to decline. Bhalla estimates a reduced-form equation to calculate the elasticity of the poverty headcount ratio to growth in incomes or consumption, and uses this regression model to forecast future poverty levels assuming the distribution of income or consumption within countries remains the same.

The World Bank has been making forecasts of the 2015 world poverty rate in its Global Economic Prospects series since 2001. In the latest edition (World Bank, 2009), the 2015 forecast is revised upwards from 10.2 to 15.5 percent, because of the ICP revisions. These forecasts apparently use a cross-country regression that posits a constant elasticity of poverty reduction to per capita income growth adjusted by estimates of changes in within-country inequality. The constant elasticity assumption is not very reliable for extending projections far into the future, given that this is about movements below or above a fixed poverty threshold. A country with incomes just below the threshold can cross the threshold with only a low level of growth, and a country with incomes far below the threshold can have high rates of growth without moving many people out of extreme poverty. A different forecasting methodology is clearly needed.

In a major new study, Hughes *et al.* (2008) review past poverty forecasting efforts in detail and present their own set of forecasts to 2055, using the “lognormal” distribution to convert estimates of average income and the Gini coefficient into poverty headcounts. This methodology has the advantage of embedding the poverty estimates directly into a long-range macroeconomic simulation model (the International Futures Model, see Hughes and Hillebrand, 2006), so Hughes *et al.* or any user of the model can not only test directly the impact of alternative assumptions about economic growth on poverty futures, but also simulate the effects of changes in a wide variety of policy levers on economic growth, and hence on poverty. The Hughes estimates are based on the old ICP data and so are not directly comparable with the new Chen/Ravallion (2008) numbers that form the basis of this study.

This chapter uses Bhalla's SAP methodology to help forecast future poverty levels. If there are estimates of future GDP, assumptions that the within-country distribution of income and consumption remains constant, and assumptions that the ratio of consumption to income is constant, the percentiles of income and consumption can simply be read off, using the same accounting framework as used in the historical analysis. All three of these key "ifs" are problematic. There is no scientifically sound methodology for forecasting global incomes and consumption decades into the future. Most long-term projections, including this one, rely on scenarios: the researcher posits a set of assumptions about the key drivers of growth, uses a model that relates these factors to economic outcomes, and produces projections that are presumed to be part of a range of plausible outcomes. The assumption of unchanging within-country distribution is often made in long-run forecasts (Chen and Ravallion, 2004), mainly because there is little scientific basis for predicting long-range changes, and the existing empirical work on the subject shows such divergent results (see World Bank, 2007, versus Higgins and Williamson 2002). Consumption-to-GDP ratios could also change for endogenous economic reasons or because of political decisions, but in this chapter they are assumed to remain constant.

The World Bank poverty estimates give good news about global poverty from 1981 to 2005, but it is likely that the very high economic growth recorded by non-OECD countries drove poverty headcounts down even further up until 2008. Using actual GDP growth rates for between 2005 and 2008, and assuming no changes in within-country distributions, Table 4.7 shows how the global poverty headcount may have fallen by more than 200 million people, and the poverty headcount ratio declined to about 18 percent.

**Table 4.7**  
**Poverty estimates**

<i>Region/country</i>	2005		2008		2006–2008
	Headcount (millions)	Ratio (%)	Headcount (millions)	Ratio (%)	Average annual growth in real per capita GDP (%)
Non-OECD	1 377	21.3	1 132	17.6	4.6
East Asia	316	16.8	247.2	15.9	5.7
China	208	15.9	148	12.3	7.5
South Asia	596	40.3	467	30.2	4.4
India	456	41.7	339	29.9	4.9
Latin America and Caribbean	46	8.4	36	6.6	3.0
Sub-Saharan Africa	391	51.2	352	44.3	2.9

Sources: Poverty estimates for 2005 from Chen and Ravallion, 2008; for 2008, author's calculations based on SAP methodology adjusted upwards based on World Bank, 2009: 117; growth rates for 2006 to 2008 from World Development Indicators and *The Economist*.

The analysis relies on the SAP methodology and a spreadsheet model that estimates average consumption by percentile of population for 182 countries. The poverty and inequality estimates from the SAP model are driven by population and economic growth numbers that are derived from scenarios produced with the International Futures (IF) model. The IF model is convenient because it contains detailed growth models for 182 states, numerous policy levers that have been calibrated based on recent empirical work at the World Bank and elsewhere, and numerous well thought-out long-range growth scenarios. It will become clear that slightly varying assumptions about a small number of key parameters can have very large effects on global poverty and inequality. The poverty forecasts presented in the following sections are based on two scenarios: the market first scenario assumes rapid technological change in OECD countries and a strong tendency towards convergence in non-OECD countries, based on globalization, pro-growth policies and institutional change; the trend growth scenario assumes less technological change, less globalization and less improvement in economic governance in slow-growth regions.

### **The market first scenario**

The market first scenario is based on the IF default scenario as of October 2008. It was compiled by the IF team at the University of Denver, United States of America, using an optimistic set of assumptions consistent with global analysis from the United Nations (UN) and the National Intelligence Council (see, in particular, National Intelligence Council, 2008; UN, 2004; UNEP, 2007). The World Bank (2007) elaborated a similar scenario. As in the World Bank work, the numbers used here are not a forecast but a scenario based on assumptions about changes in population, capital stock and productivity gains. High growth is based on assumptions of strong technological change brought about in OECD countries by continuing R&D. Non-OECD countries advance by catch-up economic growth fostered by high investment, improved governance, efficiencies from expanded trade and financial linkages, and rising investment in human capital. There is clearly much scope for catch-up growth in non-OECD countries, but there is also no scientific way of forecasting how much convergence will be achieved or what growth enhancing or retarding policies will be followed in each country.

The assumptions used here produce another golden age of growth, with world growth and growth in most regions higher than in the last 25 years. With economic growth at this high pitch, world poverty shrinks dramatically. The number of people in extreme poverty shrinks from 1 377 million people in 2005 (the Chen/Ravallion starting point) to 964 million in 2015 and 245 million in 2050 (Table 4.8). Strong economic growth leads to the eradication of extreme

poverty in India, but not China. China's far more unequal distribution of income and consumption put it at a disadvantage in eliminating poverty. Sub-Saharan Africa cuts its poverty rate substantially but, assuming continuing high population growth rates,<sup>17</sup> the number of people living in extreme poverty continues to grow after 2015. A few countries in East and South Asia (Afghanistan, Bangladesh, Nepal, Pakistan and the Democratic People's Republic of Korea) and Haiti account for most of the rest of the people still living in extreme poverty in 2015. By 2050, assuming per capita income growth of more than 2 percent a year, the poverty headcount in sub-Saharan Africa has started to fall but is still more than 200 million people. In this high-growth scenario, by 2050, the global poverty rate is only 2.5 percent.

**Table 4.8**  
**Poverty estimates in the market first scenario**

Region/country	Average annual growth of real GDP per capita 2006–2050 (%)	Headcount at USD 1.25 a day			Poverty ratio		
		Constant within-country distributions			2005 (%)	2015 (%)	2050 (%)
		2005 (millions)	2015 (millions)	2050 (millions)			
World	3.0	1 377	964	245	21.3	13.3	2.5
OECD	2.9						
Non-OECD	3.6	1 377	964	245	24.8	15.3	3.0
East Asia and Pacific	4.3	316	126	15.6	16.8	5.3	0.7
China	4.8	207	106	12.4	15.9	7.6	0.8
South Asia	4.3	596	249	14.1	40.3	15.4	0.6
India	3.9	456	243	0	42.0	19.8	0.0
Sub-Saharan Africa	2.5	391	395	205	50.9	41.1	11.7
Latin America	3.4	46	35	7.8	8.2	5.6	1.0
Near East and North Africa	3.3	11.0	8.7	0.7	3.6	2.2	0.1
Eastern Europe and former Soviet Union	3.4	17.3	13.5	2.1	3.7	3.8	0.4
World Gini coefficient		0.684	0.680	0.648			

Sources: Historical data from World Development Indicators, with estimates from Maddison, 2003 for missing data; scenario data from simulations with the IF model.

The world Gini coefficient falls to 0.648 in 2050, but still remains high compared with most within-country distributions, because economic growth is assumed to continue to be strong in OECD and other rich countries. Continued high global inequality and high Gini coefficients within many countries are

17. The population growth rates embedded in the IF forecasts closely track the UN's mid-range population forecast.



troublesome features even in this low-poverty scenario, and may prevent the poverty falls from occurring. Alesina and Perotti (1993) found that income inequality hurts growth by increasing political instability and thereby decreasing investment. Rowan (1996) believes that inequality heightens class conflict, produces capital flight and encourages redistributive policies that can be self-defeating. Chua (2004) believes that global inequalities provoke resentment of the poor towards the rich countries, at best inhibiting cooperation and trade, and at worst provoking violence.

Sub-Saharan Africa performs relatively poorly in the market first scenario, but even there the poverty headcount eventually starts to decline. Economic growth in this scenario is not low by world historical standards, and is good by Africa standards – per capita GDP is projected to rise by 2.5 percent per year for the region. The average of country growth rates is similar, but the IF projections show a wide range of country growth rates,<sup>18</sup> from -0.8 percent per year in Togo to 5.9 percent in the United Republic of Tanzania. These rates of growth are enough to bring the poverty rate down sharply in the region, but population growth is so high and the starting level of income so low in most countries that it takes a GDP per capita growth rate of at least approximately 2 percent per year to bring the poverty headcount down. Cameroon, the Democratic Republic of the Congo and Liberia are among the weakest performers, and eight of the 38 countries projected show higher poverty headcounts in 2050 than in 2005. High projected economic growth in Ethiopia, Mozambique, Nigeria and the United Republic of Tanzania accounts for about 70 percent of the fall in the regional poverty headcount. South Africa nearly succeeds in eliminating extreme poverty, not because of high economic growth but because its poverty headcount ratio in 2005 was so low that it did not require much positive per capita economic growth to push almost all of the population above the poverty threshold.

The IF model also produces estimates of food supply and demand, by country, which are consistent with its demographic and economic projections. World food demand in this high economic, medium population growth scenario increases by about 1.3 percent a year to 2050. World supply rises somewhat less because substantial improvements in technology and transportation infrastructure are assumed to cut crop losses sharply. Land devoted to crop production is assumed to rise only slightly, while technological advances increase world average crop yields by about 0.9 percent per year (Table 4.9). Calories available per person rise everywhere, particularly in sub-Saharan Africa. If alternative assumptions were made, by assuming a reduction in the technological advances that aid food

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18. Mainly because of different assumptions about policy changes by country, and between-country historical differences in translating policy changes into economic growth.

production, the relative price of foodstuffs would increase, some countries would be advantaged and some disadvantaged, but overall world economic growth would slow and poverty increase.<sup>19</sup>

**Table 4.9**  
**World food supply and demand in the market first scenario**

	World crop production (million tonnes)	Crop land (million ha)	Yield (tonnes ha)	Crop loss ratio (%)
2005	4 190	1 544	2.71	30.3
2050	6 584	1 617	4.07	22.3
Change (%)	57.1	4.7	50.0	
Average annual change (%)	1.0	0.1	0.9	
Calories available per person				
	World	OECD	Non-OECD	Sub-Saharan Africa
2005	2 800	3 421	2 662	2 256
2050	3 207	3 635	3 135	2 588
Change (%)	14.5	6.3	17.8	14.7
Average annual change (%)	0.3	0.1	0.4	0.3

Source: IF model.

### How might distribution shifts affect future poverty headcounts?

It has been seen that economic growth is not the only factor that matters for changes in poverty levels; shifts in the amount of production made available for consumption (the consumption-to-GDP ratio) and shifts in the distribution of consumption among a population (Lorenz curve shifts) can also have large impacts on poverty.

**Lorenz curve shifts:** Kuznets (1955) suggested that economic development itself made income distributions more unequal, by increasing returns to capital and leaving the rural poor lagging further behind workers in the modernizing sectors of the economy. More recent work by Ravallion (2001) and Dollar and Kraay (2002) rebuts the idea that growth has negative or any systematic effects on distribution. However, Barro (2000) suggests that income inequality tends to rise until a country reaches a per capita income of USD 4 815 (in 2000 PPP dollars), when it starts to fall.<sup>20</sup>

19. More interactions between growth, inequality and food supply and demand could be generated for a revised version of this chapter.

20. This idea could be explored empirically in another version of this chapter.

Some researchers have attempted to forecast changes in within-country income distributions based on demographic shifts. Using data from the 1960s to the 1990s, Higgins and Williamson (2002) find a strong relationship between trends in income equality and demographic shifts: inequality decreases as higher-earning middle-age cohorts grow in proportion to the rest of the population. The authors forecast very large decreases in within-country inequality over the next 50 years, with the weighted average African Gini coefficient falling from 0.464 in the 1990s to 0.378 in 2050, and the Latin American and Pacific Rim regions experiencing similar proportionate declines. Higgins and Williamson also report estimated changes in the ratio of income of the highest to the lowest quintiles (Q5-to-Q1) for the three regions.

Although the Higgins and Williamson regional income distribution estimates do not give a clear linkage to the country income and consumption distributions used in this chapter, their forecast of the declines in Gini coefficient and Q5-to-Q1 ratios can be used to generate forecasts of country distributions. The resulting headcounts can then be calculated to show the sensitivity of the poverty and Gini coefficient numbers to the Higgins and Williamson forecast. The new country distribution estimates used in this simulation capture the essence of the Higgins and Williamson estimates: the three regional Gini coefficients fall by the same ratio, and the Q5-to-Q1 ratios fall by the same amounts. The postulated change in within-country inequality, motivated by shifting demographics, reduces the global poverty headcount estimate for 2050 from 245 million to 127 million people.

However, researchers at the World Bank (2007) have recently used other empirical work suggesting a conclusion opposite to that of Higgins and Williamson: as the shares of older workers rise in proportion to the total workforce, inequality rises “since wage dispersion within these groups tends to be high” (World Bank, 2007: 85). The World Bank suggests an increase of about 0.04 in the African regional Gini coefficient by 2030, and an increase of 0.016 in the Asian Gini coefficient. From rough estimates of what the World Bank numbers would mean to the percentile distributions used in this chapter – with the inferred Q5-to-Q1 ratios rising in Asia and Africa, instead of falling as in the Higgins and Williamson case – the shifting within-country distribution pushes up the 2050 global poverty headcount to 328 million people.

Thus the two conflicting views of the endogenous future of Lorenz curve shifts create a band of about a 100 million people on either side of the market first scenario projected poverty headcount of 245 million in 2050. Of course, governments may also undertake policy measures that, explicitly or unintentionally, shift the Lorenz curve in either direction.

***Shifting consumption-to-GDP ratios:*** Consumption-to-GDP ratios average about 56 percent in OECD countries, and fluctuated around a narrow range from 1981 to 2005. The average consumption-to-GDP ratio for non-OECD countries is similar, but much more variable among countries, with numbers ranging from 14 to 171 percent of GDP using PPP data from the World Bank's World Development Indicators database. Using implicit consumption figures from the household surveys reported on the Povcal website, and dividing by the GDP figures from the World Development Indicators database, the range becomes even greater, from 7 to 237 percent. Some very large ratios occur in war-torn countries, where investment is probably very low and foreign aid very high. Some very small ratios occur in countries with substantial mineral export wealth. It is also possible that some of the large and small numbers are due to data errors in the household surveys, national income accounts data or both.

The analysis presented in Table 4.5 shows that the poverty estimates were significantly affected by past shifts in consumption-to-GDP ratios, particularly the huge implicit decline in the Indian consumption figures. In a long-run scenario such as this, with very high growth rates over time, it could plausibly be assumed that the non-OECD consumption rates ought to converge and stabilize near the present OECD levels. Such an experiment was not conducted for this chapter, but its results would probably not have had a great impact on the overall numbers – because the starting point for non-OECD countries was not very dissimilar from that of OECD countries – although they could dramatically affect those countries that are now far from the OECD average.

However, this analysis also suggests that the conventional concept of pro-poor growth that looks at just the shift in income Lorenz curves and economic growth (Kakwani and Pernia, 2000; Chen and Ravallion, 2001) is inadequate – shifts in the consumption ratio must also be considered, and should not be treated as independent of either growth or the Lorenz curve. An increase in the consumption ratio, other things being equal, reduces the poverty headcount. If an increase in the ratio comes at the expense of productive investment, however, the long-term effect could be anti-poor.

This chapter's poverty measures rely on household consumption surveys that reflect changes in aggregate consumption figures with little correlation to changes in consumption and GDP figures in the national income accounts. This use of sometimes inconsistent data weakens an important analytical link between poverty and economic growth. For example, according to national income accounts data (converted into 2005 PPP data by the World Bank), India's real GDP per capita grew at an average annual rate of 3.8 percent from 1981 to 2005, and private consumption per capita grew at 2.9 percent per year. The Povcal

database per capita consumption figures, based on household survey data, grew at just 1.0 percent per year over this period. If Chen and Ravallion (2001) are correct in stating that the household surveys are a better measure of consumption than the national income accounts, it should probably be concluded that the GDP growth estimates are not reliable. More detailed analysis is required, illuminating not just the forces behind shifts in the Lorenz curve but also the connection between consumption measured by the household surveys and economic growth.

Setting aside these analytical problems, the numbers in the market first scenario tell a good-news story. The extreme poverty headcount is shrinking, in most regions by 2015, and in all regions by 2050. The original MDG global poverty headcount ratio – 15 percent by 2015 – should be reached easily.<sup>21</sup> While this chapter focuses on the numbers at the USD 1.25 a day standard, the improvements at the more generous USD 2.50 a day standard are even more impressive: from 3 085 million people (48 percent of world population) in 2005, to 710 million (7.3 percent) in 2015. Even in the pessimistic scenario, in which demographic shifts lead to worsening within-country distributions (the World Bank scenario), the global poverty headcount still shrinks dramatically because of good economic growth.

The trouble with this good-news story, however, is that it is just a scenario; there is no way of knowing whether world economic growth rates will be anywhere near this high, or how within-country distributions will change. The growth rates assumed in the market first scenario are almost all higher than those that actually occurred in the post-Second World War “golden age” of global growth, when so many of the poverty rate reductions calculated by Bourguignon and Morrisson (2002) occurred.

Economic growth of more than 3 percent per year in real per capita terms in non-OECD countries is certainly possible over the next 40 years. Most of the countries in this group are so far behind the OECD countries in productivity levels that they have enormous growth potential through adopting modern techniques and gradually converging towards OECD-level productivity. The long-term growth rates envisioned in the market first scenario for Africa, Latin America and the Near East are actually quite close to the growth rates achieved in 2002 to 2007, coinciding with an unusually high period of world economic growth. Even assuming that war, resource constraints or climate difficulties do not intrude, maintaining such high growth rates will involve enormous changes in governance, institutions and attitudes in many countries.

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21. Chen and Ravallion (2008) suggest that as the original goal was a “halving of the extreme poverty ratio from 1990 to 2015”, the upwards revision of the historical numbers implies that the new goal should be closer to 20 than 15 percent. This goal is also easily reached in the market first scenario.

*Comparison with other long-range growth and poverty projections:* Nobel-Prize winning economist Robert Lucas (2000) has produced a similar scenario. He believes that non-OECD countries will converge with OECD countries over the course of this century, and cites three major reasons:

- Technology diffusion (Tamura, 1996) – the idea that knowledge produced anywhere benefits producers everywhere;
- improvements in governance (Parente and Prescott, 1994) – “governments in the unsuccessful economies can adopt the institutions and policies of the successful”;
- diminishing returns and flows of resources – “high wages in the successful economies lead to capital flows to the unsuccessful economies, increasing their income levels”.

Lucas’ world growth model suggests that the long period of rising global income inequality that began with the industrial revolution in 1800, slowed down or ended in recent decades and will reverse itself in this century: “I think the restoration of inter-society income equality will be one of the major economic events of the century to come.”<sup>22</sup>

Rowan (1996) predicts that within a generation most of the world’s population will be rich or at least much closer to being rich than it is today. Not only will incomes converge across countries, but the world will also become more peaceful and democratic. Rowan does not deny the existence of enormous problems in every part of the non-OECD world, but he believes that better policies and growing social capabilities will spur growth:

*A major reason why there are still poor countries is that their economic policies have produced unstable prices and employment, domestic prices out of line with world ones, inefficient nationalized and regulated industries, low trade shares, little foreign capital and technology, and obstacles for the creation of new industries. Such errors are now widely being corrected. Import-substitution policies are being replaced by export-oriented ones, countries hitherto hostile to foreign investment are encouraging it, regulations being reduced, firms privatized, and more.* (Rowan, 2006: 93)

Maddison (2007) has also produced a bullish long-run economic forecast to 2030, although one with more diverse regional results than the market first scenario. He forecasts that between 2003 and 2030, non-OECD countries will grow almost twice as fast as OECD countries (at 3.0 compared with 1.7 percent a year) in real per capita terms. He assumes that technological advances will keep

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22. The Lucas arguments and quotes cited are from Lucas, 2000: 164–166.

growth high in the mature economies, and expects that convergence forces will allow China and India to average about 4.5 percent per capita growth in real terms. Growth will slow over the period, as these countries approach the technological frontier and are forced to devote more resources to environmental and welfare issues. He assumes that Latin America will continue on a slow growth path, owing to outright rejection or half-hearted implementation of pro-growth policy reforms. He projects only 1 percent per capita growth in sub-Saharan Africa.

The global growth optimism in the market first scenario is replicated in the Intergovernmental Panel on Climate Change (IPCC) A1 global warming scenarios, which envision very rapid economic growth of 3.1 percent per year in real world per capita GDP for 2001 to 2050, based on increased globalization and rapid introduction of new technology (IPCC, 2009).

The bullishness of all these scenarios comes from their sharing of similar concepts about economic growth. The projections are based, implicitly or explicitly, on the extended neoclassical growth model and assumptions about the same factors that are presumably growth-promoting, such as the institutional and policy factors that promote or discourage convergence. Economists at the World Bank and elsewhere are in general agreement on the nature of the governance and institutions that work best to promote long-run economic growth:

- Free markets and private property are better at generating growth than centralized government control of production, but a strong government is essential to enforce the rules of peaceful economic behaviour and alleviate inevitable market failures.
- Trade and financial market liberalization is needed to spur competition and the flow of investment funds, including increased access to developed country goods and capital markets.
- Democratic accountability of government is helpful, to keep both corruption and predation from destroying incentives to work, save and invest, and to encourage pro-growth spending on education, health and infrastructure.<sup>23</sup>

Despite wide, but not universal, acceptance of these principles, however, there is little agreement on how countries can or should transition to modernity and on what outsiders can do to help. It took hundreds of years for Western Europe and North America to develop, from within, the institutions that propel the modern economy, and the Washington Consensus ideas provide only general principles, not specific policy guidance. No well-meaning expert has the ability

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23. This list stems from the original Washington Consensus list proposed by Williamson (1989). For a more up-to-date discussion, see Commission on Growth and Development (2008) and Rodrik (2008). Olson (1996), provides a discussion on overcoming the collective action problem.

to design a fail-safe programme that guarantees economic success, even in countries with governments willing to reform. In addition, the application of policies aimed at converting these principles into practice under the guidance of the International Monetary Fund and the World Bank has led to numerous policy failures, few successes and much bitterness (Easterly, 2001). There is also some outright political opposition to many of the tenets of this market-oriented approach to economic governance, and it is very easy for political leaders to resist or overthrow reform efforts for reasons of intellectual disagreement, ignorance, domestic politics or personal (or group) advantage (for more on this, see Acemoglu and Robinson, 2006).

The market first scenario also assumes that OECD countries continue to grow at high rates in per capita terms, compared with historical norms. This is not implausible. Despite the severe recession of 2008/2009, the OECD countries have economic and political institutions designed to generate good economic growth, and large expenditures for R&D expand the knowledge frontier in a way that could well lead to significant productivity gains for decades to come. Growth in countries at the technological frontier depends mainly on human capital development, and there is no physical limit on that. (For optimistic discussion about the future of technology, see Schwartz, 1999; and Duesterbeg and London, 2001.)

High OECD growth by itself probably hurts the global inequality numbers, but it is helpful to economic growth, and hence poverty reduction, in non-OECD countries. OECD countries face their own set of problems, however, especially in dealing with a rapidly ageing population that threatens to undermine the social contract underpinning economic success. It is easy to imagine a scenario with much lower economic growth in both OECD countries and the rest of the world.

### **The trend growth scenario**

An alternative scenario calculates what would happen to global poverty if the benign assumptions that drove convergence of the non-OECD countries in the market first scenario did not occur. Instead, most countries are assumed to continue on the same trajectory they have been on for the last 25 years. For some countries, notably China and India, this is a very good trajectory, but for Latin America, Africa and the Near East, recent economic history has not been favourable, apart from for a few years in the early 2000s, when almost all countries participated in an unsustainable global boom.

In the trend growth scenario, the per capita growth rate in non-OECD countries as a whole is about half a percentage point per year less than in the market first scenario, but the growth assumptions are cut drastically in the countries where most of the poverty is – those in sub-Saharan and North Africa and a few in Asia



and Latin America. As demonstrated, the market first scenario assumes very large increases in these countries' economic growth, compared with the past two decades.

What happens to global poverty if economic growth rates do not improve from levels recorded in 1981 to 2005? In some regions, the trend growth assumptions do not do much to raise poverty, even at the USD 2.50-a-day definition, because there is not much extreme poverty to begin with (as in Latin America, although some countries such as Haiti are badly hurt) or because the trend rates of economic growth are high (as in India and China). However, sub-Saharan Africa – which was helped in the market first scenario by some extremely favourable assumptions about policy, or even regime, changes – is seriously hurt. By 2050, the extreme poverty rate is almost five times what it was estimated to be in the market first scenario (Table 4.10).

**Table 4.10**  
**Poverty in the slow-growth regions: comparison of scenarios**

	2005		2050 market first scenario		2050 trend growth scenario	
	USD 1.25/ day	USD 2.50/ day	USD 1.25/ day	USD 2.50/ day	USD 1.25/ day	USD 2.50/ day
	<i>(millions of people below the poverty threshold)</i>					
Latin America	46.1	122	7.8	21.1	56.9	147
Near East and North Africa	11	86.7	0.7	2.5	9.4	48.1
Sub-Saharan Africa	391	614	205	533	930	1 364
World	1 377	3 085	245	710	1 120	1 948
	<i>(% of population)</i>					
Latin America	8.4	22.1	1.0	2.7	7.4	19.2
Near East and North Africa	3.6	28.4	0.1	0.6	1.7	8.9
Sub-Saharan Africa	51.2	80.5	11.7	30.5	53.1	77.9
World	21.3	47.7	2.6	7.6	12.0	20.9

Sources: 2005 figures from Chen and Ravallion, 2008; 2050 figures from author's calculations.

In the trend growth scenario, the trend towards global income equality is stalled. A global Gini coefficient of 0.684 in 2005 is pushed down to 0.648 in 2050 in the market first scenario, but is barely shifted – to 0.679 in 2050 – in the trend growth scenario.

### *Expanding absolute income gaps in both scenarios*

The absolute income gap between OECD and non-OECD countries does not shrink in either scenario. In the optimistic market first scenario, this gap rises from almost USD 30 000 per person in 2005 (in PPP dollars, 2005 price levels) to USD 98 000 in 2050, even though the non-OECD per capita GDP growth rate is almost a percentage point higher than the OECD average annual growth rate over

the 45 years of the scenario. The ratio of OECD to non-OECD per capita income falls sharply, from 7.4 to 5.3, but the absolute gap more than triples.

However lamentable, a widening of the gap in absolute terms is almost inevitable, unless OECD countries stop growing. If they failed to grow at all for the next 45 years (versus 2 percent or more per year in these scenarios), it would take non-OECD countries 57 years at 3.6 percent a year growth (as in the market first scenario) to catch up with the average OECD GDP per capita income figure of USD 34 359. Even though this could be thought a desirable result, it is likely that lower growth in OECD countries would lead to lower growth in the rest of the world – it is difficult to imagine non-OECD countries growing robustly if OECD countries are stagnant.

Simulations with the IF model suggest that long-run sub-Saharan African growth would fall by between 40 and 140 percent as much as OECD growth falls, depending on assumptions about protectionism and technology. African economic growth in the IF model is also quite sensitive to the level of foreign aid. Gradually raising foreign aid contributions to 0.75 percent of OECD GDP has no discernible impact on OECD growth, but it increases sub-Saharan African growth by almost 1 percentage point a year and reduces the sub-Saharan poverty headcount by 120 million people by 2050. The model simulations implicitly assume that most of the aid (an extra USD 6.5 trillion over 45 years) is productively invested in physical and human capital.<sup>24</sup>

In all of these scenarios, extreme poverty becomes much more highly concentrated in sub-Saharan Africa, because higher economic growth in Asia, particularly India and China, removes hundreds of millions of people from the global poverty headcount. Assuming 2 percent per year population growth, sub-Saharan Africa needs 2 percent per year per capita GDP growth (and constant within-country distributions) just to prevent the extreme poverty headcount from rising. Faster growth – 2.5 percent per year in the market first scenario – cuts the headcount from 391 million in 2005 to 205 million in 2050, and higher growth rates are possible. However, in addition to raising GDP growth, lowering population growth or flattening within-country distributions could also help reduce the poverty headcount. If, somehow, sub-Saharan Africa could cut its population growth by half but still manage GDP per capita growth of 2.5 percent a year, the 2050 poverty headcount would fall to fewer than 100 million people. If the 2.5 percent GDP per capita growth rate is combined with the low population growth rate, and with the Higgins and Williamson (2002) favourable distribution forecast, extreme poverty in sub-Saharan Africa would almost disappear.

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24. Of course, there is no guarantee that aid will be well spent. Sachs (2005), Easterly (2001), Collier (2007) and Moyo (2009) give differing views on the utility of foreign aid.

### *Comparison with other long-range growth and poverty projections*

One of the most famous pessimistic scenarios in the literature was created and is periodically revised by Meadows and her associates (Meadows, 1972; Meadows, Randers and Meadows, 1992; 2004), who claim that present trends in population, industrialization, pollution and resource depletion will make current world economic growth rates unsustainable. They use a very different sort of model from the neoclassical growth model. The World3 model<sup>25</sup> is based on the idea that world systems, especially the agricultural system, have a finite carrying capacity that has nearly been reached. In the authors' reference scenario, global output per capita peaks around 2025, then goes into irreversible decline, mainly because of the collapse of world agriculture. This model contains no country detail or poverty estimates, but it clearly portrays a much poorer planet than that envisioned in even the trend growth scenario. The major difference between the limits to growth scenarios and the more optimistic ones discussed in this chapter is pessimism about the possibility of technological change to overcome perceived physical constraints.

Another line of thinking is represented by Wallerstein's (2004) world systems analysis. In this approach, instead of the world moving towards improved and globalized capitalism as envisioned in the market first scenario, the capitalist world economy collapses, owing mainly to underconsumption and resentment of the peripheral countries towards the core. Unfortunately for the purposes of this chapter, Wallerstein presents no scenario of future developments after the collapse.

Bremer (2009) does not predict the collapse of global capitalism, but he does worry about a retreat from the market principles reflected in the Washington Consensus and a growing embrace of "state capitalism". He discusses the rise of state-owned energy companies, the renationalization of strategic industries in many non-OECD countries, and the growth of sovereign wealth funds: "The free-market tide has now receded. In its place has come state capitalism, a system in which the state functions as the leading economic actor and uses markets primarily for political gain" (Bremer, 2009: 41).

Bremer sees this development as anti-poor. By distorting incentives and creating vast new opportunities for corruption and rent-seeking, state capitalism will inevitably slow growth and limit poverty reduction. State capitalism promotes protectionism and subsidies that will further restrict growth. Eichengreen and Irwin (2007) argue that, at best, there will be a long pause in United States trade policies geared towards liberalization and that "past gains from liberalization will get whittled away as countries backslide on previous commitments" (Eichengreen and Irwin, 2007: 25). A recent paper by Hillebrand (2010) using empirical estimates by Estavadeordal and

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25. The computer model is available from the publishers: [www.chelseagreen.com](http://www.chelseagreen.com).

Taylor (2008) estimates that a global retreat into protectionism (with tariff levels returning to pre-Uruguay Round levels) might improve income inequality in a few countries, but would cut economic growth by almost one percentage point a year to 2035, and raise the global poverty headcount by at least 170 million people.

## **Conclusions**

This chapter has taken a long view of economic growth, poverty and inequality, from 1820 to 2050. Although the data are far from perfect, and the methodology for filling the gaps requires a substantial amount of guesswork, key contributions in the literature, especially Maddison (1995; 2001; 2003) and Bourguignon and Morrisson (2002), have established that world economic growth has been, on average, very high since 1820 – high enough to cause global poverty to fall dramatically. More recent work, especially by Chen and Ravallion (2004; 2008), has shown that the downwards trend in the global poverty rate accelerated after 1980, and that even the poverty headcount has started to show a significant decline.

This chapter has projected world poverty rates, headcounts, inequality measures and absolute income gaps to 2050, based on two different scenarios for global economic growth. In the optimistic growth scenario, the global poverty rate at the USD 1.25 a day standard falls sharply, from 21.3 percent in 2005 to 2.5 percent in 2050, and the number of people living in extreme poverty falls by 1.1 billion. However, the absolute gap between per capita incomes in OECD and non-OECD countries, and the global Gini coefficient remain high.

An alternative scenario assumes that the regions that have been lagging (sub-Saharan Africa, the Near East and Latin America) do not transition to a high growth path. This results in much higher poverty levels: almost 900 million more people living in absolute poverty in 2050 than in the optimistic scenario. The chapter considers, but does not explore empirically, even more depressing scenarios. Resource constraints, if not met by technological solutions, will surely make the poverty estimates shown here worse. A breakdown of the world capitalist system, as envisioned by Wallerstein (2004), or even a gradual turning away from the system that has done so much to reduce global poverty over the last two centuries, would be disastrous.

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