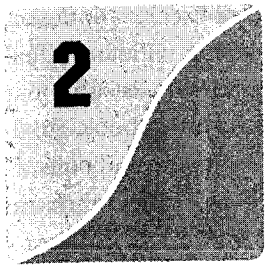


Measuring Economic Growth and Development

A native American saying recommends, "One should not go hunting a bear unless one knows what a bear looks like." This is sound advice for bear hunters; it also has meaning for our inquiry. Understanding how to achieve economic development requires some agreement on what we want to achieve.

The previous chapter drew a distinction between economic growth and economic development. Economic growth refers to a rise in real national income per capita—that is, a rise in the inflation-adjusted, per person, value of goods and services produced by an economy. This is a relatively objective measure of economic capacity. It is widely recognized and can be computed with varying degrees of accuracy for most economies. There is far less of a consensus on how to define economic development. Most people would include in their definition increases in the material well-being of individuals as well as improvements in basic health and education. Others might add changes in the structure of production (away from agriculture toward manufacturing and services), improvement in the environment, greater economic equality, or an increase in political freedom. Economic development is a normative concept, one not readily captured by any single measure or index.

To understand the magnitude of the global challenge of development, it is essential to be able to track what has happened to an economy over time and make comparisons between countries. If we want to understand why some nations experienced more rapid growth and development than others, we need measures of economic performance that are relatively accurate and comparable. Poor countries are environments in which information is scarce and data can be of questionable quality, so we have to assure ourselves that our indicators, though imperfect, are sufficiently

robust to help us understand the outcomes we observe. The study of economic development requires us to combine our insights on how economies work with an appeal to the evidence to check if our insights are consistent with experience. Measurement is central to this process and will be an issue we return to throughout this book.

To get started, this chapter introduces measures of national income and considers the problem of making cross-country comparisons when national incomes are expressed in different currencies. Equipped with a means of making comparisons of national income levels, we examine the record both over time and across countries. These data highlight the enormous differences in economic growth that have characterized different regions of the world over the past 500 years as well as over the more recent past. Much of the rest of this book is devoted to understanding what has caused these differences.

Economic growth may be central to achieving economic development, but there is much more to economic development than growth alone. Not only the level of per capita income but how that income is produced, spent, and distributed within and between countries determines development outcomes. There is much debate about how to define and measure economic development. We introduce two widely cited indicators of economic development, the human development index and the millennium development goals, and consider their strengths and weaknesses. The information presented in this chapter may not make you a better bear hunter but it will inform the rest of your study of development economics.

MEASURING ECONOMIC GROWTH

At the core of studies of economic growth are changes in national income. Two basic measures of national income are commonly employed. **Gross national product (GNP)** is the sum of the value of finished goods and services produced by a society during a given year. GNP excludes intermediate goods (goods used up in the production of other goods, such as the steel used in an automobile or the chips that go into a computer). GNP counts output produced by citizens of the country, including the value of goods and services produced by citizens who live outside its borders. GNP is one of the most common terms used in national income accounting. The World Bank and other multilateral institutions often refer to this same concept as gross national income (GNI). **Gross domestic product (GDP)** is similar to GNP, except that it counts all output produced within the borders of a country, including output produced by resident foreigners, but excludes the value of production by citizens living abroad. GNP or GDP divided by total population provides a measure of **per capita income**. Economic growth refers to changes in per capita income over time.

The distinction between GNP and GDP can be illustrated using examples from two very different economies, Angola and Bangladesh. More than three-quarters of

Angola's national income is derived from oil. Multinational companies drill for most of the oil and repatriate their profits. These profits count as part of Angola's GDP but not its GNP. In 2009, Angola's GDP was 12 percent higher than its GNP. By contrast, Bangladesh has few natural resources and little foreign investment. Large numbers of Bangladeshis work abroad, especially in the Persian Gulf: men often as construction workers and Bangladeshi women as domestics. The value of the output produced by these Bangladeshi workers counts as part of Bangladesh's GNP (since these workers are Bangladeshi nationals) but not as part of its GDP (because the work is performed outside of the country). In 2009, Bangladesh's GNP was 9 percent higher than its GDP. In most countries the differences between GNP and GDP are much smaller. In part because it is easier to track economic activity within a nation's borders, GDP has become the more widely used measure of national income by the International Monetary Fund (IMF), UN Development Programme, World Bank, and other multilateral agencies as well as by researchers engaged in analyzing cross-country data and trends. We follow this convention and refer primarily to GDP and GDP per capita as measures of national income from here on. Unless otherwise indicated, when discussing trends over time, we refer to **real GDP** and real GDP per capita—that is, per capita gross domestic product adjusted for domestic price inflation.[1]

The contribution of a sector or component of GDP, such as manufacturing or agriculture, is measured by the value added by that sector. **Value added** refers to the incremental gain to the price of a product at a particular stage of production. Therefore, the value added of the cotton textile industry is the value of the textiles when they leave the factory minus the value of raw cotton and other materials used in their production. At the same time, the value added is equal to the payments made to the factors of production in the textile industry: wages paid to labor plus profits, interest, depreciation of capital, and rent for buildings and land. Because the total value added at all stages of production equals total output, GDP is a measure of both total *income* and total *output.*

MEASURING GDP: WHAT IS LEFT OUT?

One way to calculate GDP is to add up the value of all the goods and services produced within a country and then sold on the market. The focus on goods and services sold in the market creates a measurement problem because many valuable contributions to society are excluded. When a farm household pays someone else to dig an irrigation ditch or repair a roof, such economic activity is included in GDP because these activities are purchased "in the market." However, when unpaid members of

[1]Real GDP is computed by deflating nominal GDP (GDP measured in current prices) by a price index. National statistical offices often calculate a variety of price indices, including the consumer price index (CPI), the GDP deflator, and others. What these indices share in common is an attempt to isolate any general increase (or decrease) in the price level for all goods.

the household perform these same tasks, they tend not to enter GDP. The scale of this problem tends to be larger in low-income countries and is evident in a poor nation like Cambodia, where about one-third of the labor force is classified as unpaid family workers, most of whom are engaged on family farms, producing food and other goods and services for their own consumption.

In most developing countries, a large number of activities do not enter the market. Much of what is produced by the agricultural sector is consumed by the farm household and never exchanged in the marketplace. To not include this production would seriously underestimate a nation's GDP. The usual practice is to include estimates from sample surveys of farm output consumed by the producer, which are then valued at the prices of marketed farm produce. This is done, for example, in Moldova and even includes the output of household garden plots. In India, estimates are made for the construction of traditional homes made out of mud, straw, and other local materials. Even illegal activity may be included, as in Afghanistan where estimates of poppy production, a banned crop, are part of the nation's GDP. Despite these adjustments, not all household production is accounted for. As economies grow, more output is transacted in the marketplace and gets included in GDP. The resulting estimates of GDP may overestimate the growth in economic activity because some of what is now captured is merely a transfer of production from within the household to the market.

An additional measurement problem for GDP arises from the need to compare apples with oranges in calculating the value of national output. A typical economy might produce thousands of different goods and services. Adding up the total value of goods and services that are traded in markets requires using their market prices. But accurate price information may not be available or may not be representative of market prices at the national level. Government agencies in poor countries may lack the means to conduct thorough market surveys of prices or may rely too heavily on information from major urban centers (where prices may be easier to track but are unrepresentative of markets around the country).

Another criticism of GDP is that it may be a measure of the goods and services produced by an economy, but does not account for the "bads" society produces. If a steel mill pollutes a river or the air, the value of the steel produced is included in GDP but the cost of pollution is not deducted. Should crime, congestion, and other social bads be deducted from estimates of GDP? *Gross* domestic product also does not account for the depreciation of goods (for example, when machinery or trucks wear out) or depletion of natural resources (when forests are cut, fisheries depleted, or mines exhausted). Proposals for making adjustments to GDP to account for these factors have been raised, but none has been widely adopted yet.[2] Although there are

[2]In 2008, President Nicolas Sarkozy of France established the international Commission on the Measurement of Economic Performance and Social Progress that included discussion of GDP as a useful measure. The commission, chaired by Joseph Stiglitz, a Nobel laureate in economics, raised many concerns about GDP as a measure of economic production and as a measure of the quality of life and of sustainability. More information is available at www.stiglitz-sen-fitoussi.fr/documents/rapport_anglais.pdf.

obvious flaws in GDP as a measure of national income, there are also many benefits. Having a widely agreed on approach to measuring national income facilitates comparisons of nations' economic activity both over time and relative to other countries. Both types of comparisons are essential to understanding the process of economic development.

EXCHANGE-RATE CONVERSION PROBLEMS

Another measurement issue we need to consider is how to compare *levels* of GDP per capita across countries. The problem arises because each nation measures national income in its own currency: dinar in Tunisia, guarani in Paraguay, leu in Moldova, and so on. Economic growth rates can be computed in a nation's own currency, but if we want to understand better what is required to transform a nation from low to high income, it is useful to compare nations at different income levels. To do so requires converting GDP per capita into a common currency. The shortcut to accomplishing this goal is to use the market exchange rate between one currency, usually U.S. dollars, and each national currency. For example, to convert India's GDP per capita (2009) of about 57,000 rupees into U.S. dollars, use the appropriate exchange rate between the two currencies (about 49 rupees per US$1 in 2009), which in this case yields an estimate of about US$1,160.

A common reaction to this low figure by anyone who has lived in or visited India (or for that matter any developing nation) is that one U.S. dollar goes much further in India than it does in the United States. A basic woman's haircut in a less-affluent part of Mumbai, for example, might cost 200 rupees (US$4 at the official exchange rate), whereas a basic haircut in Boston might run US$40. If one can buy more for $1 in India than one can in the United States—in this example, 10 haircuts in Mumbai for the price of 1 in Boston—then India's true level of per capita income must be higher than the one given by converting currency using the official exchange rate.

There is considerable merit to this argument. One problem with converting per capita income levels from one currency to another is that exchange rates, particularly those of developing countries, can be distorted. Trade restrictions or direct government intervention in setting the exchange rate make it possible for an official exchange rate to be substantially different from a rate determined by a competitive market for foreign exchange.

But even the widespread existence of competitively determined market exchange rates would not eliminate the problem. The huge price difference in haircuts between Boston and Mumbai is not the result of trade restrictions or a managed Indian exchange rate. Instead, a significant part of national income is made up of what are called **nontraded goods and services**—that is, goods that do not and often cannot enter into international trade. Haircuts are one example. Internal transportation, whether by bus, taxi, or train, cannot be traded, although many transport inputs, such automobiles and rail cars, can be imported. Wholesale

and retail trade and elementary school education also are nontraded services. Land, homes, and office buildings are other obvious examples of goods that are not exchanged across national borders. Generally speaking, whereas the prices of traded goods tend to be similar across countries (because, in the absence of tariffs and other trade barriers, international trade could exploit any price differences), the prices of nontraded goods can differ widely from one country to the next. This is because the markets for nontraded goods are spatially separated and the underlying supply and demand curves can intersect in different places, yielding different prices.

Exchange rates are determined largely by the flow of traded goods and international capital and generally do not reflect the relative prices of nontraded goods. As a result, GDP converted to U.S. dollars by market exchange rates gives misleading comparisons of income levels if the ratio of prices of nontraded goods to prices of traded goods is different in the countries being compared. The way around this problem is to pick a set of prices for all goods and service prevailing in one country and to use that set of prices to value the goods and services of all countries being compared. In effect, one is calculating a purchasing power parity (PPP) exchange rate. Thus a cement block, a computer chip, or a haircut is assigned the same value whether it is produced in New Delhi or New York.

The essence of the procedure can be illustrated by the numerical exercise presented in Table 2-1. The two economies in the table are called the United States and India for illustrative purposes, and each economy produces one traded commodity (steel) and one nontraded service (retail sales). Each economy produces a different amount of each good. GDP, expressed in local currencies, is equal to the total value of production of steel plus retail sales. A ton of rolled steel sells for about $1,000 in the United States and Rs 50,000 in India. The value of the services of retail sales personnel is estimated in the most commonly used way, which is to assume the value of the service is equal to the wages of the worker providing the service. (For the United States we assume earnings of $10 per hour, working 40 hours per week for 50 weeks, for annual earnings of $20,000. In India, we assume annual earnings of Rs 60,000.) Wages are likely to differ widely across countries and to be determined almost exclusively by domestic labor supply and labor demand conditions. This is because workers cannot easily migrate from one country to another to take advantage of any differences in wages (partly because of immigration rules and partly because the cost of moving to a new country can be high, both financially and psychically). From the data in Table 2-1 we determine that GDP in the United States equals $240 billion and in India, Rs 1,490 billion.

One way of comparing the GDP levels in the two economies is to convert them into a single currency, say, the U.S. dollar. In this simple world of two goods and two nations, the exchange rate is determined solely by trade in steel. If steel is freely traded between the two countries, then the exchange rate settles where the price per ton of steel in the two countries is equal—that is, at the point at which the U.S. price of $1,000 per ton equals India's price of Rs 50,000 per ton or

TABLE 2-1 Market Exchange Rate Versus Purchasing Power Parity Methods of Converting GDP

	UNITED STATES			INDIA		
	QUANTITY	PRICE (US$)	VALUE OF OUTPUT (BILLION US$)	QUANTITY	PRICE (RUPEES)	VALUE OF OUTPUT (BILLION RUPEES)
Steel (million tons)	200	1,000 per ton	200	25	50,000 per ton	1,250
Retail sales personnel (millions)	2	20,000 per person per year	40	4	60,000 per person per year	240
Total GDP (local currency, billions)			240			1,490

Market exchange rate based on steel prices = Rs 50,000/$1,000 or Rs 50 = US$1.

1. India's gross domestic product (GDP) in U.S. dollars calculated by using the official exchange rate: Rs 1,490 billion/Rs 50 = US$29.8 billion.

2. India's GDP in U.S. dollars calculated by using U.S. prices for each individual product or service and applying that price to India's quantities (that is, using purchasing power parity [PPP]):
   Steel: 25 million tons × $1,000/ton = $25 billion
   Retail sales personnel: 4 million people × $20,000/person = $80 billion
   GDP: $25 billion + $80 billion = $105 billion

3. Ratio of PPP calculation of India's GDP to official exchange rate calculation: $105 billion/$29.8 billion = 3.5

where US$1 = Rs 50.[3] Using this market-determined exchange rate, India's GDP of Rs 1,490 billion equals US$29.8 billion, or about 12 percent of U.S. GDP in this hypothetical example.

The problem with this comparison is that, although Rs 50 and US$1 purchase the same amount of steel in both countries, they purchase different amounts of the nontraded good. To compare the GDP levels of the two nations taking into account this difference in the purchasing power of the respective currencies, we cannot rely on market exchange rates. An alternative approach is to use a common set of prices applied to the output of both countries. We can calculate Indian GDP in U.S. dollars by applying U.S. prices for each product or service to India's quantities. (We could also compute U.S. GDP in terms of India's prices but the convention is to express PPP estimates in terms of U.S. dollars.) This PPP calculation results in India's steel production valued at US$25 billion and retail sales valued at US$80 billion, for an estimated India GDP of US$105 billion. In this example, the PPP calculation of

[3]At any other exchange rate, there would be profitable opportunities to buy more steel from one of the two countries, causing changes in the market for foreign exchange until the two steel prices were equivalent and the exchange rate settled at US$1 = Rs 50. This is sometimes referred to as *the law of one price,* reflecting how opportunities for arbitrage in traded goods lead to price convergence in these goods.

India's GDP is more than three times as large as the calculation that relied on market exchange rates. In terms of PPP, India's GDP is over 40 percent of the U.S. GDP.

Table 2-1 presents a hypothetical PPP conversion for two countries using two goods. The task becomes significantly more complicated in a world of tens of thousands of goods and more than 200 nations. The **International Comparison Program (ICP)**, which began in 1968 under the auspices of the United Nations and is now overseen by the World Bank, tackles this difficult task by deriving a set of **international prices** in a common currency. Detailed price data on a basket of hundreds of specific goods have been collected periodically for an ever-increasing number of nations. International prices are then derived by aggregating the price data from the individual countries and are used to determine the value of national output at these standardized international prices. The most recent round of international price comparisons released by the ICP was based on 2005 data and represented a significant quality improvement over the previous round of price data from 1993. Key elements of this improvement were coverage of a larger number of countries (146 countries in 2005 as compared to only 118 in 1993) and more careful comparison of specific goods and services across countries. (The next update of the ICP will be based on 2011 data, to be released in 2013.) Estimates of national income in terms of PPP are reported in the publications of the IMF, UN Development Programme (UNDP), World Bank, and other multilateral agencies. Researchers have made extensive use of these data.[4]

The ratio of GDP per capita based on international prices relative to GDP using official exchange rates ranged in 2009 from about 0.7 in Norway to 3.3 in the Gambia (Table 2-2). For high-income countries, like Germany, Japan, and the United Kingdom, the ratio is close to 1.0. This means market exchange rate conversion is a close approximation of what is obtained when converting German, Japanese, or UK GDP into international price dollars using the PPP method. This is to be expected because at similar levels of income the prices of nontraded goods tend to be similar as well. For low- and middle-income economies the ratio is greater than 1, consistent with the finding that the degree to which the official exchange rate conversion method understates GNP is related, generally, to the average income of the country. For China the ratio is 1.8, for Bolivia 2.5, for Vietnam and Ethiopia 2.7, and for India 2.8.

With differences of this magnitude, comparisons of per capita income levels using market exchange rate conversions can be misleading. Market exchange rates suggest that per capita incomes in the United States were about 40 times those in India in 2009. PPP calculations narrow the multiple to about 14 times—still a huge gap but maybe a more reasonable indicator of relative income levels. Another way of appreciating the difference between making comparisons of GDP using market exchange rates versus PPP is to think about world GDP as a whole. When world GDP

[4]If you read *The Economist* you may be familiar with another measure of PPP, the Big Mac index, which was introduced, lightheartedly, in 1986 and has been reported on annually ever since. The common basket of goods is a cheese hamburger with lettuce, onions, and pickles on a sesame bun. For a discussion of the Big Mac index as a measure of PPP, see M. Pakko and P. Pollard, "Burger Survey Provides Taste for International Economics," Federal Reserve Bank of St. Louis, *The Regional Economist* (January 2004), 12–13.

TABLE 2-2 Comparing GDP per Capita Using Market Exchange Rates and PPP in 2009 (US$)

COUNTRY	GDP AT MARKET EXCHANGE RATES	GDP AT PPP	RATIO OF PPP CALCULATION TO MARKET EXCHANGE RATE CALCULATION
Norway	79,089	56,214	0.7
Japan	39,738	32,417	0.8
Germany	40,670	36,378	0.9
United Kingdom	35,165	35,155	1.0
United States*	45,989	45,989	1.0
Hungary	12,868	20,312	1.6
Lebanon	8,175	13,070	1.6
China	3,744	6,828	1.8
Botswana	6,064	13,384	2.2
Bolivia	1,751	4,419	2.5
Vietnam	1,113	2,953	2.7
Ethiopia	344	934	2.7
India	1,192	3,296	2.8
The Gambia	430	1,415	3.3

*Gross domestic product (GDP) per capita in the United States is unchanged when measured in terms of purchasing power parity (PPP). This must be the case because the United States is used as the reference country by the International Comparison Program (ICP). As with any index number, the price index at the heart of the ICP must be compared relative to some base, and by convention, U.S. prices were selected.

Source: World Bank, "World Development Indicators," http://databank.worldbank.org.

is calculated by converting each nation's GDP into a common currency using market exchange rates, the low- and middle-income economies account for 29 percent of world output. When the calculation is based on PPP, the low- and middle-income economies account for 44 percent of world output.

PPP allows for more valid comparisons of real income levels across economies. But PPP has its limits too. Trade and capital flows are transacted at market exchange rates and should be converted at those rates. The ICP provides a consistent set of PPP estimates of national income, but these are only estimates and critics have pointed out flaws in data collection and methodology.[5] PPP conversions cannot correct for

[5]Angus Deaton provides a useful introduction to the ICP in "Reshaping the World: The 2005 Round of the International Comparison Program," in Prasada Rao and Fred Vogel, eds., *Measuring the Size of the World Economy: The Framework, Methodology, and Results from the International Comparison Program* (Washington, DC, World Bank, in press). Problems associated with constructing PPP estimates are discussed in Angus Deaton and Alan Heston, "Understanding PPPs and PPP-Based National Accounts," *American Economic Journal: Macroeconomics* 2, no. 4 (2010), 36–45.

underlying problems in the measurement of GDP in a nation's own currency. Variations in the quality of goods cloud cross-country comparisons. In addition, the specific price index constructed by the International Comparison Project gives more weight to the goods consumed in rich nations and tends to bias upward the GDP of poorer nations that consume a different basket of goods. This index number problem occurs whenever one studies the aggregate performance of an economy over time or compares the performance of different economies. But, despite these problems, much can be learned from the data at hand, and PPP estimates of GDP per capita are central to the study of economic growth and development.

ECONOMIC GROWTH AROUND THE WORLD: A BRIEF OVERVIEW

We now turn from exploring the measurement of GDP to examining the actual performance of countries around the world in terms of the rate of growth of GDP per capita.[6] We begin by looking at the findings of economic historian Angus Maddison, who estimated income levels and corresponding rates of economic growth for the world economy as far back as the year 1 B.C.E. Such an exercise requires a lot of conjecture, especially the further back in time one goes. To perform the analysis, Maddison compiled estimates of population, GDP, and a price index for determining PPP.[7]

According to Maddison's calculations, average world income in 1000 was virtually the same as it had been 1,000 years earlier. In other words, growth in per capita income between 1 B.C.E. and 1000 was effectively zero. The next 820 years (from 1000 to 1820) were barely any better, with world income per capita growing, on average, by just 0.05 percent per year. (Note: This is not a growth rate of 5 percent; it is a growth rate of 0.05 percent.) During those 820 years, world GDP grew by only slightly more than the growth in world population. After eight centuries, world per capita income had increased by only 50 percent. To place this in some perspective, China today is one of the world's fastest-growing economies. With more than 1 billion people (about four times the entire world's population in 1000), economic growth in China averaged about 9.5 percent over the past decade, raising Chinese per capita incomes by 50 percent, not in 820 years but in just under 5 years!

[6]In this section we derive the growth rate of real GDP per capita in PPP using the formula for annual compound growth, $Y_t = Y_0(1 + r)^t$, where Y refers to real GDP per capita in PPP; t, the number of years under consideration; r, the rate of growth of real GDP per capita; and Y_0 refers to real GDP per capita in the base year and Y_t in the final year. Alternative ways of estimating growth rates are discussed in Box 3-2.

[7]Angus Maddison died in 2010. His work is being maintained by his colleagues. The data reported here are from Maddison's original web page titled "Statistics on World Population, GDP and Per Capita GDP, 1-2008 AD." Links are available at www.ggdc.net/MADDISON/oriindex.htm, accessed February 2012.

Maddison's estimates indicate considerable uniformity in per capita incomes throughout the first millennium. The little bit of economic growth that did take place over the next 800 years was centered in western Europe and in what Maddison calls the western "offshoots" (Australia, Canada, New Zealand, and the United States). By 1820, these regions already had a decided advantage over the rest of the world. For example, whereas China and India may have been slightly ahead of the western European countries in 1000, average per capita incomes in western Europe and in their offshoots were already double those of China and India by 1820. Box 2–1 offers one explanation for some of the early and divergent trends and their consequences for the world we live in today.

Maddison's research suggests that rapid economic growth as we know it really began around 1820. He estimates that over the subsequent 190 years, the average growth in world income increased to 1.3 percent per year. Note that the difference between annual growth of 0.05 percent and 1.3 percent is huge. With the world economy growing at 0.05 percent per year, it would take more than 1,400 years for average income to double. With annual growth of 1.3 percent, average income doubles in just 55 years. The world had changed from no growth at all during the first millennium, to slow growth for most of the second millennium, to a situation in which, in the past two centuries, average real income began to double in less than every three generations.

Maddison's estimates of average income levels for the world's major regions since 1820 are shown in Figure 2–1.[8] Several features of these data are notable. First, economic growth rates clearly accelerated around the world since the early 1800s and especially after 1880. Second, and perhaps most striking, the richest countries recorded the fastest growth rates and the poorest countries recorded the slowest growth rates, at least until 1950. Per capita income in the Western offshoots grew by about 1.6 percent per year between 1820 and 1950, while in Asia it grew by only 0.16 percent. As a result, the ratio of the average incomes in the richest regions to those in the poorest regions grew from about 2:1 in 1820 to about 13:1 in 1950.

Between 1950 and 2008, the patterns of economic growth changed, at least in several regions. The gap between the Western offshoots and western Europe, which had been widening through 1950, narrowed significantly. The poorest region in 1950 (Asia) recorded the fastest subsequent growth rate (3.6 percent), thereby beginning to close the income gap with the richer regions of the world. By contrast, Latin America's growth stagnated during the 1980s and 1990s, and eastern Europe's collapsed after the fall of the Berlin Wall in 1989. Both regions resumed economic growth during the 2000s.

[8]Note that the *y*-axis in Figure 2–1 expresses GDP per capita in PPP using Geary-Khamis (GK) dollars, another PPP index. Figure 2–1 also expresses per capita income in logarithms. We will have more to say about the use of log scales later in this chapter. For now, it will be useful to know that when using a log scale, the slopes of the lines for each region are estimates of the growth rate of GDP per capita.

BOX 2-1 JARED DIAMOND: GUNS, GERMS, AND STEEL

Most of this textbook is devoted to understanding why over the past 50 years some countries have experienced rapid economic growth and development while others have not. Jared Diamond, a physiologist, geographer, and Pulitzer Prize–winning author, poses a related but different question. The world as we know it is the result of the historical dominance of Eurasians, especially people of Europe and East Asia. Why, Diamond asks, did history turn out this way? Why did things not work in reverse with Native Americans, Africans, and Aboriginal Australians conquering Europeans? We know that Hernán Cortés, the conquistador, overthrew the Aztec Empire and began Spanish colonization of the Americas. But Diamond wants to understand why the opposite did not happen. Why didn't Emperor Montezuma cross the Atlantic and conquer Europe? World history would have turned out differently had he done so.

For Diamond, much of the history of the last two centuries is the result of what happened in the previous 10,000 years. It was the advantages Europe and Asia had over other continents by 1500 that determined much of what followed. Diamond is interested in the early divergence of regional incomes. He identifies the "proximate causes" of Eurasian dominance over other regions: guns, germs, and steel. Eurasians had guns and steel for swords, which gave them their military advantage; they carried diseases, such as measles and smallpox, which decimated other populations; and they had political structures that could finance seaworthy ships and organize expeditions that led to the conquest of other lands.

But these are only proximate causes. Diamond digs deeper asking why Eurasians had these advantages more than 500 years ago. Diamond's explanation is geography. Eurasia has a land mass that has an east–west axis whereas Africa and the Americas have a north–south orientation. An east–west axis permitted the more rapid spread of both domesticated animals (cattle, chickens, horses) and edible grains, which in turn permitted more rapid development of settled farming communities. In time, these communities became productive enough to support craftsmen and others who developed the technologies that led to the guns, ships, and steel necessary for foreign adventures and conquest. If a continent has a north–south axis, plant and animal varieties cannot spread as rapidly because they need to adapt to different climates as they move from one area to the next, thus significantly limiting the opportunity for economic growth.

Domesticated agriculture also lies behind the germs that decimated indigenous populations in the Americas and elsewhere. Many infectious diseases result from microbes crossing over from animal populations to humans. Eurasians acquired these diseases and built up their immunity to them as a consequence

of developing settled agriculture early. As more densely populated communities came in close contact with their farm animals, diseases spread as did immunity to them. Eurasia also happened to have more animal species suitable for domestication than other continents. As Diamond writes, "Just think what the course of world history might have been if Africa's rhinos and hippos had lent themselves to domestication! If that had been possible, African cavalry mounted on rhinos and hippos would have made mincemeat of European cavalry mounted on horses."

Sources: Jared Diamond, *Guns, Germs and Steel: The Fates of Human Societies* (New York, W. W. Norton, 1998). A summary is contained in a 1997 talk by Jared Diamond, "Why Did Human History Unfold Differently on Different Continents for the Last 13,000 Years?" April 22, 1997, transcript available at http://edge.org/conversation/why-did-human-history-unfold-differently-on-different-continents-for-the-last-13000-years, accessed February 2012.

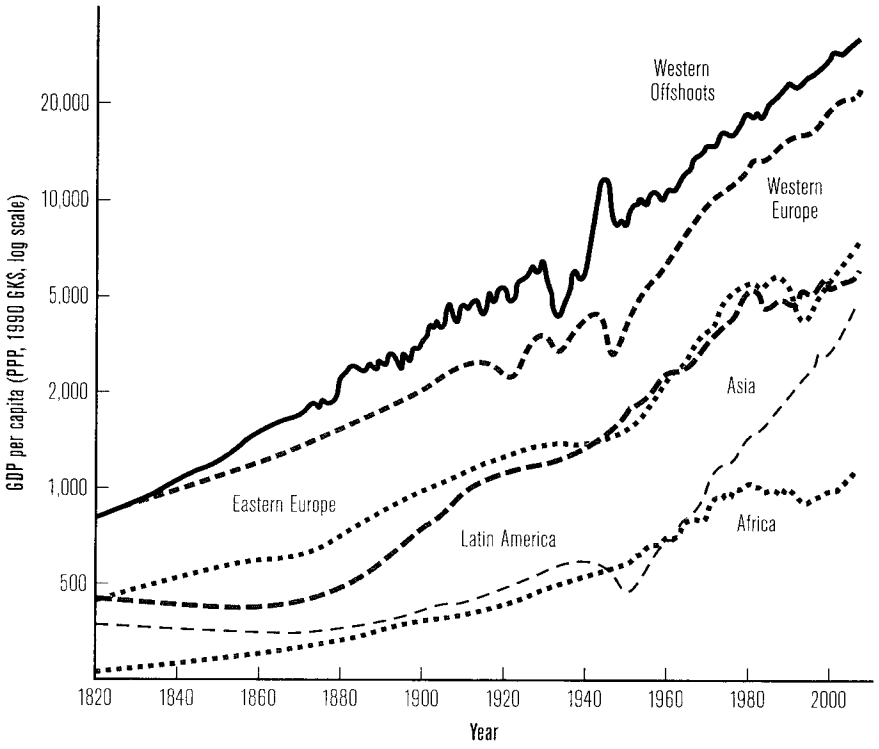


FIGURE 2-1 Levels of GDP per Capita by Region: 1820–2008

Notes: Western offshoots include Australia, Canada, New Zealand, and the United States. GDP, gross domestic product; GK$, Geary-Khamis dollars; PPP, purchasing power parity.
Source: Angus Maddison, "Statistics on World Population, GDP, and Per Capita GDP, 1-2008 AD," www.ggdc.net/MADDISON/Historical_Statistics/vertical-file_02-2010.xls.

In Africa, as elsewhere, average growth rates accelerated after 1820 and did so again after 1950, in the period associated with the end of the colonial era. But as in Latin America, economic growth in Africa faded after 1980, continued to stagnate in the 1990s, and rebounded only recently. As a result, the income gap between the world's richest regions (the Western offshoots) and the poorest in 2000 (Africa) reached 19:1. According to Maddison's work, this is the largest gap in income between rich and poor regions the world has ever known.[9] Because of resurgence in economic growth in Africa during the 2000s, this gap has narrowed but still remains huge by historical standards.

Maddison's broad sweep of world economic history indicates how differential rates of economic growth, especially over the past two centuries, have produced the divergence in income levels that characterizes the world's economy today.

ECONOMIC GROWTH, 1970–2010

Table 2–3 takes a closer look at the pattern of growth rates over the past four decades. The selection of decades as the unit of observation is somewhat arbitrary. The 1970s often are associated with two oil price shocks and other significant changes in commodity prices; the 1980s, with the first wave of international debt crises; the 1990s, with the major transition toward market economies, especially in eastern Europe and the republics of the former Soviet Union; and the 2000s, with the global consequences of the attacks of September 11, 2001, and of the financial crisis of 2008–09. The regional divisions in Table 2–3 differ from those in Maddison and conform to conventions used by the World Bank, a major source of data on economic development. Most of the regional definitions are self-explanatory; however, all high-income economies are combined in one category regardless of geographic location. Therefore, East Asia does not include Japan, Korea, Singapore, Taiwan, and a few small and affluent island economies. Similarly, Europe and Central Asia refers primarily to eastern Europe and Central Asia and excludes all (mostly western) European economies classified as high-income.

The growth rates in GDP per capita reported in Table 2–3 highlight major differences in economic growth both between regions and over time.[10] The 1970s were a decade in which *all* regions experienced positive growth. The 1980s often are referred to as "the lost decade" in Latin America because of the sharp downturn in regional

[9]Using a somewhat different methodology from that employed by Maddison, Lant Pritchett reached similar conclusions in "Divergence, Big Time," *Journal of Economic Perspectives* 11, no. 3 (1997), 3–17.

[10]The growth rates in Table 2–3 are based on constant US$. Although large differences in the *level* of GDP per capita are observed depending on whether PPP or market exchange rates are used, this is not the case when comparing *growth rates* of national income. The growth rates reported in the table are the differences between World Bank estimates of GDP growth and population growth by region and by decade.

TABLE 2-3 Rate of GDP per Capita Growth (Percent/Year)

	1970s	1980s	1990s	2000s
East Asia and Pacific	5.0	6.4	6.1	8.6
Europe and Central Asia	4.4	1.5	−2.9	5.7
Latin America and Caribbean	3.0	−0.3	1.7	2.5
Middle East and North Africa	3.0	−1.1	0.8	2.9
South Asia	1.2	3.5	3.8	5.7
Sub-Saharan Africa	1.1	−1.2	−0.2	2.6
High income	2.4	2.5	1.8	1.3

Sources: World Bank, *World Development Report 1995* (New York: Oxford University Press, 1995). World Bank, *World Development Report 2000/2001* (New York: Oxford University Press, 2001). World Bank, *World Development Report 2011* (Washington, DC: World Bank, 2011).

growth, from +3.0 percent in the 1970s to -0.3 percent in the following 10 years. Negative growth and falling per capita income also were features of the Middle East and North Africa region and sub-Saharan Africa in the 1980s. Growth in sub-Saharan Africa also remained negative, but by a smaller amount, throughout the 1990s. The economies of Europe and Central Asia collapsed in the 1990s after the transition from a planned to a market-based economic system. But the region rebounded during the 2000s, in some cases because of large improvements in commodity prices, especially oil, and in other cases because of the integration of these countries with the global economy. The poor performance of some regions during the 1980s and 1990s stands in sharp contrast to the accelerating growth rates—and the associated improvements in living standards—in both East and South Asia. The term *economic miracle* has been used to describe the historically unprecedented rates of growth achieved by some nations in these two regions.

The growth rates in Table 2-3 also reveal that the 2000s were the best decade since the 1970s for the low- and middle-income nations as a group. The political and economic events that rocked the high-income economies, especially the United States and the European Union, did not have the same impact elsewhere. Such resiliency on the part of low- and middle-income nations was not expected based on the experience of the 1980s and 1990s. Sub-Saharan Africa's improved growth performance is especially noteworthy. Some of it is due to much higher commodity prices. Emerging economies in the region are also benefiting from improved economic policies and management, more democratic and accountable governments, new technologies, and a new generation of development-oriented African leaders and entrepreneurs.[11]

[11]Steven Radelet, *Emerging Africa: How 17 Countries Are Leading the Way* (Washington, DC, Center for Global Development, 2010).

There are a few more points to take away from the growth rates presented in Table 2–3. First, remember that even small differences in growth rates imply huge differences in the potential for economic development. In the 1970s, economic growth in South Asia was 1.2 per year. At this rate, GDP per capita in the region expanded by a mere 12.5 percent in a decade. In the 1980s, South Asia achieved a growth rate a few percentage points higher, 3.5 percent, and ended the decade with a 41 percent increase in GDP per capita. In the 2000s, growth rates again grew by a few more percentage points, reaching 5.7 percent. That decade ended with per capita incomes 75 percent higher than they began. Second, the regional averages in Table 2–3 are weighted averages, where the weights are the population size of each nation in the region. Such averages are heavily influenced by the experience of the most populous country in the region, especially China in East Asia and India in South Asia, and disguise the wide range in individual country performance. For example, in East Asia, the Philippines' annual growth rate from 1979 to 2009 was only 0.7 percent, a fraction of its region's performance; Botswana grew at 4.4 percent per annum over these three decades, far exceeding not only the sub-Saharan Africa average but the performance of most nations worldwide.

The successful growth performance in Asia and a few countries in other regions relative to the high-income economies illustrates an observation by economic historian Alexander Gerschenkron. When Gerschenkron refers to "**the advantages of backwardness**," he is not suggesting that it is good to be poor. Instead, he means that being relatively poorer might allow low-income countries to grow more quickly. For the first nations to experience modern economic growth, in western Europe and its offshoots, growth rates were constrained by the rate of technological progress. That same constraint operates today. Growth rates in the high-income economies reported in Table 2–3 range from 1.3 to 2.5 percent, far lower than the growth rates of the successful regions in the developing world. Poor countries can borrow and adapt existing technology and have the potential to grow faster and to catch up to the more advanced economies. Over the past three decades, this is what enabled growth rates in Asia to exceed the average growth rate of the high-income nations. For development economists, the challenge is to understand why some countries have been able to realize the advantages of backwardness whereas others have fallen further behind.

WHAT DO WE MEAN BY *ECONOMIC DEVELOPMENT*?

As indicated in Chapter 1, economic growth is a necessary but not sufficient condition for improving the living standards of large numbers of people in countries with low levels of GDP per capita. It is necessary because, if there is no growth, individuals can become better off only through transfers of income and assets from others. In a

poor country, even if a small segment of the population is very rich, the potential for this kind of redistribution is severely limited. Economic growth, by contrast, has the potential for all people to become much better off without anyone becoming worse off. Economic growth has led to widespread improvements in living standards in Botswana, Chile, Estonia, Korea, and many other countries.

Economic growth, however, is not a sufficient condition for improving mass living standards for several reasons. First, governments promote economic growth not just to improve the welfare of their citizens but also, and sometimes primarily, to augment the power and glory of the state and its rulers. Governments in developing nations may use national income to expand their militaries or construct elaborate capital city complexes in deserts and jungles. Political leaders may be corrupt and expropriate income for personal gain, whether for conspicuous consumption at home or the accumulation of wealth in overseas bank accounts and property. When gains from growth are channeled in such ways, they often provide little benefit to the country's citizens. Second, resources may be heavily invested in further growth, with significant consumption gains deferred to a later date. In extreme cases, such as the Soviet collectivization drive of the 1930s, consumption can decline dramatically over long periods. When the Soviet Union fell in 1991, its consumers were still waiting for the era of mass consumption to arrive. Normally, the power to suppress consumption to this extent in the name of economic growth is available only to totalitarian governments. Third, income and consumption may increase, but those who already are relatively well off may get all or most of the benefits. The rich get richer, the old saw says, and the poor get poorer. (In another version, the poor get children.) This is what poor people often think is happening. Sometimes, they are right.

If economic growth does not guarantee improvement in living standards, then GDP per capita may not be a meaningful measure of economic development. In addition to problems associated with how income is spent and distributed, any definition of economic development must include more than income levels. Income, after all, is only a means to an end, not an end itself. More than 2,000 years ago, Aristotle wrote, "The life of money-making is one undertaken under compulsion and wealth is evidently not the good we are seeking, for it is merely useful for the sake of something else."

If economic growth and economic development are not the same thing, how should we define economic development? Amartya Sen, economist, philosopher, and Nobel laureate, argues that the goal of development is to expand the *capabilities* of people to live the lives they choose to lead. Income is one factor in determining such capabilities and outcomes, but it is not the only one. To be capable of leading a life of one's own choice requires what Sen calls "elementary functionings," such as escaping high morbidity and mortality, being adequately nourished, and having at least a basic education. Also required are more complex functionings, such as achieving self-respect and being able to take part in the life of the community. Income is but one of the many factors that enhance such individual capabilities.

In his 1998 Nobel address, Sen identified four broad factors, beyond mere poverty, that affect how well income can be converted into "the capability to live a minimally acceptable life":

- *Personal heterogeneities*: including age, proneness to illness, and extent of disabilities.
- *Environmental diversities*: shelter, clothing, and fuel, for example, required by climatic conditions.
- *Variations in social climate*: such as the impact of crime, civil unrest, and violence.
- *Differences in relative deprivation*: for example, the extent to which being impoverished reduces one's capability to take part in the life of the greater community.

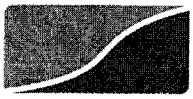
According to Sen, economic development requires alleviating the sources of "capability deprivation" that prevent people from having the freedom to live the lives they desire.

Sen's seminal contributions played a key role in the formulation of the human development approach to economic development. This approach is also associated with the UNDP and the work of Pakistani economist Mahbub ul Haq. Part of the motivation of Haq and Sen was a concern over the focus by other development economists on economic growth. Like Aristotle, they wanted to explore how "money-making" was "useful for the sake of something else." They wanted to see the focus shift from the production of commodities to a focus on human lives, including the enhancement of individual capabilities and the enlargement of people's choices.

MEASURING ECONOMIC DEVELOPMENT

The UNDP published its first human development report in 1990 with "the single goal of putting people back at the center of the development process." Although the terminology is different, human development and economic development are the same idea. The distinction is intended to expand the perception of development as encompassing more than increases in per capita income (Box 2-2).

The UNDP attempted to quantify what it saw as the essential determinants of human development: to live a long and healthy life, acquire knowledge, and have access to the resources needed for a decent standard of living. For each of these elements, a specific measure was constructed and aggregated into an index, the **Human Development Index (HDI)**. Every year since 1990, the UNDP has calculated the value of the HDI for as many of the world's nations as the data permit and assessed the relative progress of nations in improving human development. Because the HDI combines outcomes with different units of measurement—years of life expectancy, years of schooling, and dollars of income—each outcome must be converted into an index number to permit aggregation into a composite measure. In response to criticisms of



BOX 2-2: HUMAN DEVELOPMENT DEFINED

Human development is a process of enlarging people's choices. In principle, these choices can be infinite and change over time. But at all levels of development, the three essential ones are for people to lead a long and healthy life, to acquire knowledge, and to have access to resources needed for a decent standard of living. If these essential choices are not available, many other opportunities remain inaccessible.

But human development does not end there. Additional choices, highly valued by many people, range from political, economic, and social freedom to opportunities for being creative and productive, and enjoying personal self-respect and guaranteed human rights.

Human development has two sides: the formation of human capabilities—such as improved health, knowledge, and skills—and the use people make of their acquired capabilities—for leisure, productive purposes, or being active in cultural, social, and political affairs. If the scales of human development do not finely balance the two sides, considerable human frustration may result.

According to this concept of human development, income is clearly only one option that people would like to have, albeit an important one. But it is not the sum total of their lives. Development must, therefore, be more than just the expansion of income and wealth. Its focus must be people.

Source: United Nations Development Programme, *Human Development Report 1990* (Oxford: Oxford University Press, 1990), p. 10.

the index, the HDI has evolved over time, including different variables and changing how the index is computed. In the *Human Development Report 2010,* the 20th anniversary of the HDI, significant changes were made to the variables used, the construction of the indices for each dimension, and the method of aggregation.

As a proxy for living a long and healthy life, the HDI employs a nation's life expectancy at birth and compares progress on this measure relative to other nations. The goalposts for assessing life expectancy are a minimum value of 20 years and a maximum of 83.2. Twenty years represents the minimum life expectancy that permits a society to sustain itself. Anything less than 20 years would be below the prime reproductive age range and a society would eventually die out. Historical evidence bears this out. The maximum value of 83.2 years is what Japan achieved in 2010, the highest level recorded in any nation over the 20 years the HDI has been calculated. A country's score on this dimension is a measure of its populations' life expectancy compared to the maximum and minimum scores. For example, in 2010, El Salvador

had life expectancy at birth of 72 years. El Salvador's HDI life expectancy index is calculated as (72 - 20) ÷ (83.2 - 20) = 0.82; in other words, El Salvador has attained 82 percent of the potential range in life expectancy.

As a proxy for acquiring knowledge, the HDI includes two variables. One is the mean years of schooling achieved by the adult population, those 25 years and older. The second variable is expected years of schooling for children of school-going ages. It is based on enrollment data. The goalposts of the adult schooling variable are 0 and 13.2, the observed maximum from the United States. For expected years of schooling, the goalposts are 0 and 20.6, the maximum referring to Australia. El Salvador's mean years of schooling among adults is 7.7 years (58 percent of the way in between the two goalposts); for expected years of schooling it is 12.1 years (59 percent). These values are then aggregated to form one composite index for education.

Access to resources is measured by transforming GNI per capita (PPP in US$).[12] The goalposts are $163 and $108,211; the minimum is the value attained in Zimbabwe in 2008, and the maximum is from the United Arab Emirates in 1980. The relative standing of a nation's GNI per capita is determined by taking the logarithms of all dollar values. The transformation into logarithms decreases the significance of income gains as income increases. This reflects the conclusions made by all the human development reports that there are diminishing returns to income as a means of securing a *decent* standard of living (or, alternatively, that the marginal utility of an extra dollar of income falls as income rises). El Salvador, with an estimated 2010 GNI per capita of $6,498, falls 57 percent between the logarithm-adjusted income goalposts (Box 2-3).

All three dimensions of the HDI are expressed in terms of a percentage, solving the problem of different units of measurement. The next challenge is how to aggregate the three dimensions. Up until 2010, this was done by giving the index of each dimension an equal weight of one third and computing the *arithmetic mean* of the three. In 2010, the three dimensions still have equal weight but now a *geometric mean* of the three percentages is computed.[13] The UNDP explains the reason for this change. Using an arithmetic mean implied "perfect substitutability" among the three components of HDI. If a nation lost, say, 10 percent on its schooling measure this could be compensated by a 10 percent improvement in income and the HDI would remain unchanged. The geometric mean does not have this property. Low achievement in one dimension is no longer linearly compensated by high achievement in another dimension. The level of each index matters, creating a situation of imperfect substitutability across

[12]Before 2010, the HDI was based on GDP values. The change to GNI was made to include remittances and foreign assistance income and to exclude income generated within a country but repatriated abroad. All three can be significant, especially for low-income countries. This recalls our earlier discussion of the differences between GDP and GNP/GNI.

[13]The calculation requires taking the cube root of the product of the three indices on life expectancy, schooling, and income.

BOX 2–3 WHY USE LOGARITHMS?

Logarithms have been used several times in this chapter and will be referred to throughout this text. It is worth reviewing some of their properties. It is easiest to understand logarithms if you remember that the answer to any question involving a logarithm is an exponent. If we want to know the logarithm of 100 in base 10, the answer would be 2, because 10 raised to the second power is 100. In mathematical notation,

$$\log_{10}(100) = 2 \text{ because } 10^2 = 100$$

The base of the logarithm merely determines what number will be raised to a given power to arrive at the value whose logarithm we are seeking. If our base were 2 instead of 10, then the logarithm of 16 would be 4, because 2 raised to the fourth power is 16:

$$\log_2(16) = 4 \text{ because } 2^4 = 16$$

The HDI uses the logarithm of income per capita rather than the level of income per capita in determining the importance of incomes in a country's human development. To see the implications, we build off our example. Assume that two nations have incomes of 10 and 100, respectively. Using these values implies a 10-fold importance to the higher income because 100 is 10 times as large as 10. What if we use logarithms instead? If we use base 10 logarithms, we can easily see how the relative importance of the higher income is reduced. As we already determined, the logarithm of 100 in base 10 is 2. What is the logarithm of 10 in base 10? It is 1, because 10 raised to the first power is 10. Using logarithms in this case reduced the relative importance of the higher income from a factor of 10 to a factor of only 2.

This reduced *relative importance* becomes more pronounced as the spread between incomes grows. If the two incomes were 10 and 1,000, using base 10 logarithms reduces the relative importance of the higher income from a factor of 100 to a factor of only 3! Logarithms are consistent with the UNDP's position that income exhibits diminishing returns in achieving human development.

Economists, including the authors of the HDI, often use the mathematical constant *e* as the base for their logarithms; these are called natural logarithms. Base *e* is closely related to the concept of continuous compounding and is a useful tool when examining economic variables that grow over time. Box 3–2 discusses this further.

One more property of logarithms is worth noting. If we track a variable in logs rather than in levels, differences in the log values imply equal *percentage* changes. For example, using logarithms in base 2,

$$\log_2(2) = 1 \text{ as } 2^1 = 2$$

$$\log_2(4) = 2 \text{ as } 2^2 = 4$$

$$\log_2(8) = 3 \text{ as } 2^3 = 8$$

$$\log_2(16) = 4 \text{ as } 2^4 = 16$$

As we move from the log values 1 to 2 to 3 to 4, the absolute change of the underlying value increases by 2 then 4 then 8, but the percentage change always remains the same at 100 percent.

This property of logarithms can be observed by considering the logarithmic scales used in Figures 2–1 and 2–2. In Figure 2–2, notice that the distance between $500 and $1,000 on the horizontal axis is the same as the distance between $20,000 and $40,000. We know that the absolute change is different along those two intervals (clearly $500 is smaller than $20,000), but both intervals represent a doubling (a 100 percent increase) of the variable. GNI per capita expressed in logarithms must behave this way.

the HDI's three dimensions. The UNDP argues that a geometric mean better reflects intrinsic differences across the indices than did the arithmetic mean.

Once the geometric mean is applied, El Salvador had a 2010 HDI of 0.659, placing it in the medium human development range, ranked 90th out of the 169 nations for which an HDI was computed. El Salvador's HDI improved from an estimated value of 0.456 in 1980, to 0.562 in 1995, to its most recent value of 0.659 in 2010. These trends suggest significant progress in El Salvador's human development over the past 30 years.

WHAT CAN WE LEARN FROM THE HUMAN DEVELOPMENT INDEX?

The basic concept behind human development is one with which many people would agree. But when we move from concept to measurement, problems arise. Many criticisms have been leveled against the HDI since it was first introduced. Some are concerned with limiting the index to only three dimensions of human development. In response, the human development reports now compute additional indices focusing on human poverty and gender-related development. An inequality-adjusted HDI was added in 2010.

Some commentators criticize the HDI for assuming diminishing returns only to income but not to either life expectancy or schooling. If the marginal utility of income declines with the more income one has, can the same be said for an extra year of life or schooling? Specific criticisms also have been raised about the introduction of a geometric mean to aggregate the three dimensions. Geometric means are

sensitive to low values; in the extreme, if one index equaled zero then the HDI would equal zero too. The same principle applies if one index is close to zero. As economist William Easterly put it, "The new HDI has a 'you're only as strong as your weakest link' property, and in practice the weakest link turns out to be very low income."[14] This is due to both the construction of the HDI and to the greater convergence across nations in life expectancy and schooling than in income. The implication for nations with the lowest HDI, including Zimbabwe, the Democratic Republic of the Congo, and Niger seems to be focus on economic growth rather than health or education. This seems the opposite of the message behind the entire human development approach. It may be the right message for these nations but it is also an unintended artifact of how the HDI is now constructed.[15]

Beyond these criticisms lies the central question of how much of an improvement the HDI is over national income per capita as an index of economic or human development. Figure 2–2 presents a comparison of HDI values and levels of GNI per capita. The scatter diagram of values for individual countries indicates, as might be predicted, that rising incomes raise the HDI. This is expected because incomes are a component of the HDI, and health and schooling also rise with incomes. According to the trend line, income alone explains 90 percent of the variation in the HDI. But the scatter diagram also indicates variance around this trend. Angola and Georgia have similar levels of per capita GNI (around US$4,900, PPP) but Angola has much lower life expectancy than does Georgia (48 versus 72 years). There is also an almost eight-year gap in schooling between the two nations. Despite identical per capita incomes, there is low human development in Angola, with an HDI of 0.403, and high human development in Georgia, with an HDI of 0.698. If one compares Mozambique and Togo the story is similar. Both have per capita incomes of close to $850, but life expectancy and schooling are much higher in Togo, raising its HDI value. In terms of HDI values, Angola and Mozambique lay well below the trend line in Figure 2–2, Georgia and Togo lay well above it.

We can conclude that alternative measures of economic development are significantly but not perfectly correlated with levels of income. This suggests that with economic growth, increasing levels of income can predict a lot about economic development. But the data also suggest that improved health and education depend on factors other than income. We elaborate on this point in the discussion of income and health in Chapter 9.

From an advocacy perspective, the HDI has been useful in calling attention to development issues. It is widely reported in the media and gets the attention of

[14]William Easterly, "The First Law of Development Stats: Whatever Our Bizarre Methodology, We Make Africa Look Worse," *AIDWATCH* (blog), December 2, 2010. http://aidwatchers.com/2010/12/the-first-law-of-development-stats-whatever-our-bizarre-methodology-we-make-africa-look-worse/.

[15]Allen Kelley, "The Human Development Index: 'Handle with Care,'" *Population and Development Review* 17, no. 2 (June 1991), 315–24 provides an early critique of the original HDI. Concerns about the 2010 version are discussed in Martin Ravallion, "Troubling Tradeoffs in the Human Development Index," Policy Research Working Paper 5484, World Bank, November 2010.

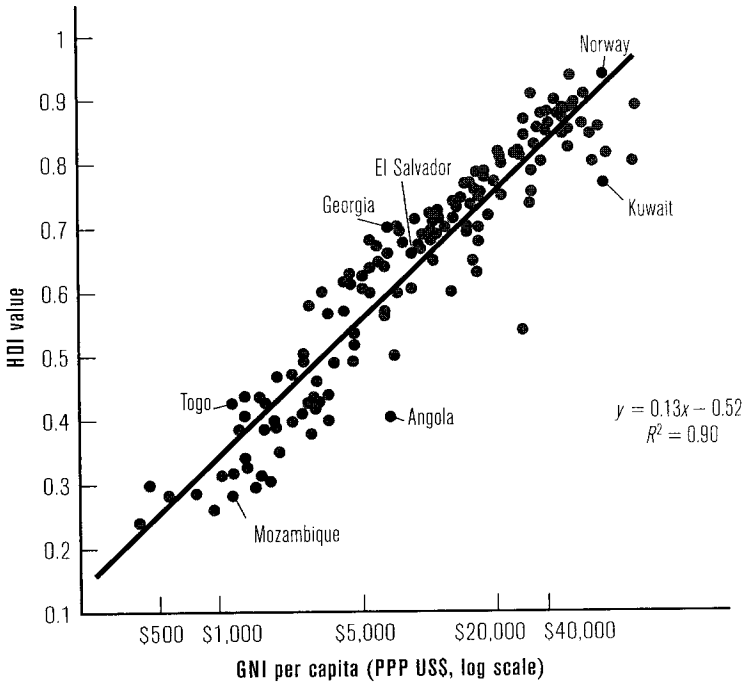


FIGURE 2-2 HDI Versus GNI per Capita by Country (2010)

Source: UN Development Programme, *Human Development Report 2010* (New York: UN Development Programme, 2010), http://hdr.undp.org/en/media/HDR_2010_EN_Contents_reprint.pdf.

political leaders. But the construction of the HDI is far from transparent and the aggregation of different dimensions of human development may not be better than a dashboard of several indicators. How much additional insight the HDI offers as a means of *measuring* economic development remains open to debate.

MILLENNIUM DEVELOPMENT GOALS

Defining economic development is inherently difficult. As with any normative concept, people have different opinions as to what should be included in the definition and on what weight to give to different goals. But even without a commonly agreed-on definition, policy makers need specific targets. One such set of targets is known as the **millennium development goals (MDGs)**.

In September 2000, 189 nations adopted the "United Nations Millennium Declaration," a broad-reaching document that states a commitment "to making the right to development a reality for everyone and to freeing the entire human race from want."[16] The declaration specifies a set of eight goals consistent with this commitment:

[16]UN General Assembly, "United Nations Millennium Declaration," section III, paragraph 11, September 18, 2000.

- Goal 1. Eradicate extreme poverty and hunger.
- Goal 2. Achieve universal primary education.
- Goal 3. Promote gender equality and empower women.
- Goal 4. Reduce child mortality.
- Goal 5. Improve maternal health.
- Goal 6. Combat HIV/AIDS, malaria, and other diseases.
- Goal 7. Ensure environmental sustainability.
- Goal 8. Develop a global partnership for development.

To more fully define these goals, a panel of experts developed a comprehensive set of targets and indicators for each of the MDGs. The eight MDGs contain 21 targets, which correspond to 60 indicators (Box 2-4). This combination of multiple goals, targets, and indicators is an articulation of what most of the world's governments believe should be achieved to make "development a reality for everyone." The

BOX 2-4 TARGETS OF THE MILLENNIUM DEVELOPMENT GOALS

Target 1A.	Halve, between 1990 and 2015, the proportion of people whose income is less than one dollar a day.
Target 1B.	Achieve full and productive employment and decent work for all, including women and young people.
Target 1C.	Halve, between 1990 and 2015, the proportion of people who suffer from hunger.
Target 2A.	Ensure that, by 2015, children everywhere, boys and girls alike, will be able to complete a full course of primary schooling.
Target 3A.	Eliminate gender disparity in primary and secondary education, preferably by 2005, and to all levels of education no later than 2025.
Target 4A.	Reduce by two-thirds, between 1990 and 2015, the under-five mortality rate.
Target 5A.	Reduce by three-quarters, between 1990 and 2015, the maternal mortality ratio.
Target 5B.	Achieve, by 2015, universal access to reproductive health.
Target 6A.	Have halted by 2015 and begun to reverse the spread of HIV/AIDS.
Target 6B.	Achieve, by 2010, universal access to treatment for HIV/AIDS for all those who need it.
Target 6C.	Have halted by 2015 and begun to reverse the incidence of malaria and other major diseases.

Target 7A.	Integrate the principles of sustainable development into country policies and programs and reverse the loss of environmental resources.
Target 7B.	Reduce biodiversity loss, achieving, by 2010, a significant reduction in the rate of loss.
Target 7C.	Halve, by 2015, the proportion of people without sustainable access to safe drinking water and basic sanitation.
Target 7D.	By 2020, to have achieved a significant improvement in the lives of at least 100 million slum dwellers.
Target 8A.	Develop further an open, rule-based, predictable, nondiscriminatory trading and financial system.
Target 8B.	Address the special needs of the least developed countries.
Target 8C.	Address the special needs of landlocked countries and small island developing states.
Target 8D.	Deal comprehensively with the debt problems of developing countries through national and international measures in order to make debt sustainable in the long run.
Target 8E.	In cooperation with pharmaceutical companies, provide access to affordable essential drugs in developing countries.
Target 8F.	In cooperation with the private sector, make available the benefits of new technologies, especially information and communications.

Source: United Nations Statistics Division, "Official List of MDG Indicators," January 2008, available at http://unstats.un.org/unsd/mdg/Host.aspx?Content=Indicators/OfficialList.htm, accessed February 2012.

millennium declaration even suggests ways in which this development agenda might be financed. For example, Target 8B, which focuses on the least developed countries, makes recommendations for debt relief and for more official development assistance from the rich nations. But none of these recommendations is binding.

The MDGs were drawn up in 2000 and their due dates are soon approaching. It is possible to assess progress thus far. Poverty reduction at the global level, for which the poverty indicator is living on less than US$1.25 (PPP) per day, is on track to meet or exceed the global target by 2015 (although the target will not be met in every country or region). Access to clean drinking water is proceeding well and should exceed the original target. More disappointing are trends in under-five mortality. In 1990, the developing regions experienced child mortality in the neighborhood of 100 deaths per 1,000 children. This fell to 66 per 1,000 by 2009. To reach the target of a two-thirds reduction in child mortality by 2015 will take, according to the United Nations, "substantial and accelerated action," especially in Sub-Saharan Africa and South Asia where child mortality rates remain high. Target 6B, universal treatment for HIV/AIDS, has met with some success. But because only 35 to 40 percent of those who

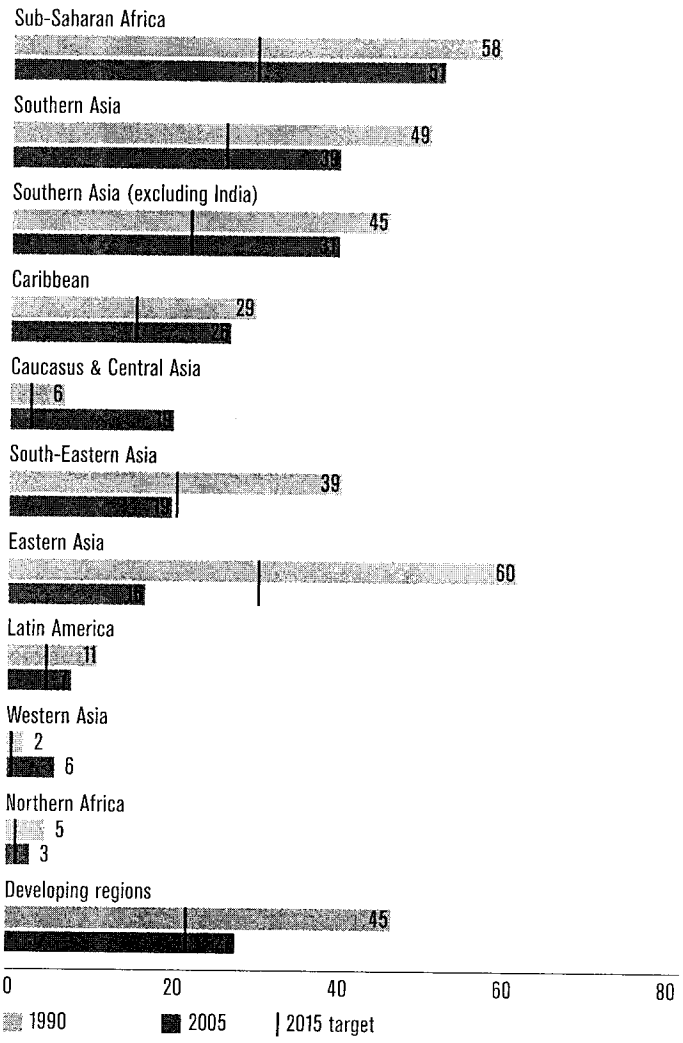


FIGURE 2-3 Proportion of People Living on Less Than $1.25 a Day, 1990 and 2005 (Percentage)

Source: Figure from the *Millennium Development Goals Report*, 2011. The World Bank. Reprinted by permission of United Nations Publications.

needed antiretroviral treatment received it in 2009, universal coverage will not be achieved by the target date. Universal treatment by 2010 was an ambitious and probably unrealistic goal.

Evaluating progress toward achieving the MDGs requires caution, especially regarding the level of aggregation across countries. Relative success and failure at meeting the MDGs varies not only among specific targets but also by region. Some of the explanation for differential performance is based on disparities in the rate of economic growth between countries. Success at cutting global poverty in half owes

a lot to China's performance alone. China reduced extreme poverty from 60 percent of its population in 1990 to only 16 percent by 2005. Yet Figure 2–3 illustrates that this global result does not describe progress in specific regions. Based on data for 2005, the most recent data available, Sub-Saharan Africa and South Asia appear far from being on track to halve poverty by 2015.

Rapid economic growth is widely seen as responsible for China's success at poverty alleviation and, by implication, much of global achievements. But *some* of the difficulty in achieving other MDGs is due to factors beyond economic growth. Better use and distribution of income and specific strategies aimed at some of the targets (such as reducing infant mortality through disease control), combined with economic growth, are essential to achieving the United Nations' goal of "freeing the entire human race from want." By setting targets, the MDGs have focused the attention of governments in poor nations and of donors in rich ones to achieve specific outcomes that promote economic development.

The MDGs have been challenged on the basis of including too much and setting targets that may be either too high or too low based on historical experience.[17] The MDGs also fail to address the fundamental economic problem of trade-offs and priorities. If one cannot fulfill all 21 targets simultaneously, which takes precedence: maternal mortality or access to safe drinking water, reducing hunger or promoting environmental sustainability? This is less of a problem for defining development: Economic development involves all these goals. But it is a practical problem for those charged with realizing such an ambitious development agenda.[18]

IS ECONOMIC GROWTH DESIRABLE?

After discussing the MDGs, which convey the absolute and relative deprivation of so many people around the world, and recognizing the positive correlation between economic growth and human development, it may seem odd to end this chapter by asking, Is economic growth desirable? The answer would seem to be an obvious and emphatic yes! But there are other perspectives. Some decry the spread of materialism, the Westernization of world cultures, and the destruction of traditional societies that seem to accompany economic growth. Others are troubled by environmental degradation, whether species loss or global warming, that has accompanied rising per capita incomes. Still others in the high-income world may wonder if we should be so quick to encourage people to follow the path we have taken: seemingly insatiable

[17]Michael Clemens, Charles Kenny, and Todd Moss, "The Trouble with the MDGs: Confronting Expectations of Aid and Development Success," *World Development* 35, no. 5 (2007), 735–51; and William Easterly, "How the Millennium Development Goals Are Unfair to Africa," *World Development* 37, no. 1 (2009), 26–35.

[18]A strategy for achieving the MDGs is laid out in a report by the UN Millennium Project, *Investing in Development: A Practical Plan to Achieve the UN Millennium Development Goals* (New York: United Nations Development Programme, 2005).

consumerism, the withering of extended and nuclear families, high levels of stress, and all the other ills associated with modern life.

Richard Easterlin, an economic historian, once observed that, although per capita incomes in the United States had risen dramatically over the preceding half century, people did not seem to be any happier. He based this conclusion, which came to be known as the **Easterlin paradox**, on survey data taken over time in which people were asked how happy they were with their lives. Easterlin found similar results when looking across a small number of high-income nations. The Easterlin paradox and, more generally, the analysis of subjective well-being, often referred to as the study of happiness, have received a great deal of attention over the past decade by economists and other social scientists. This research has been enabled by newly conducted surveys of happiness and life satisfaction covering countries at all income levels. The motivation behind this research has included many of the concerns raised throughout this chapter about whether GDP or GNI per capita is a useful measure of economic well-being.

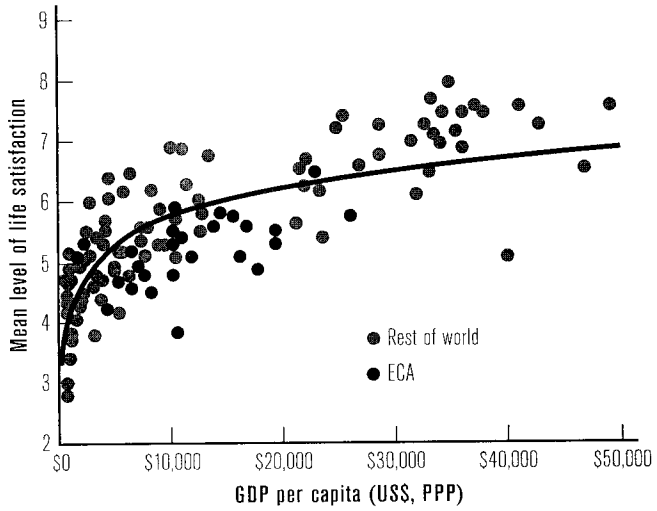
How can happiness be measured? One set of surveys asks individuals, "Taking all things together, would you say you are: very happy, quite happy, not very happy, or not at all happy?" Responses are coded from 1 to 4, with 4 signifying "very happy." Easterlin's work was based on questions like this. Another set of surveys directed at life satisfaction asks a related but different question:

> Please imagine a ladder with steps numbered from 0 at the bottom to 10 at the top. Suppose we say that the top of the ladder represents the best possible life for you, and the bottom of the ladder represents the worst possible life for you. On which step of the ladder would you say you personally feel you stand at this time, assuming that the higher the step the better you feel about your life, and the lower the step the worse you feel about it? Which step comes closest to the way you feel?

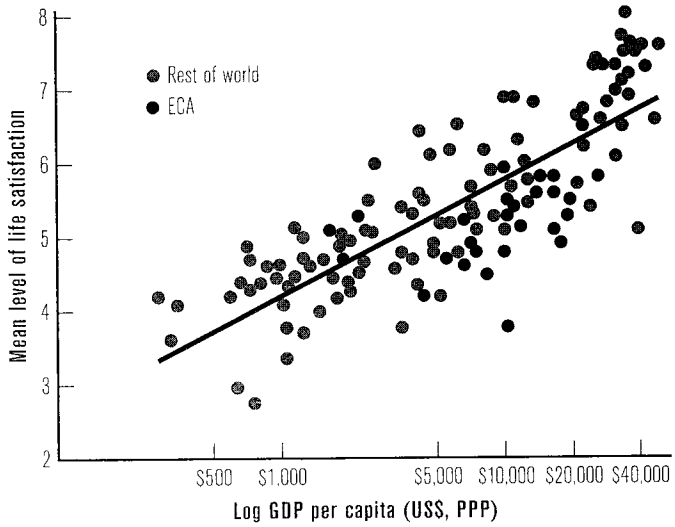
Surveys that ask both of these questions find that responses are well but not perfectly correlated. Happiness and life satisfaction are not identical.

Based on data from the life satisfaction question, which include a relatively large sample of countries, the plots in Figure 2–4a show the life satisfaction score against GDP per capita (US$, PPP). In Panel b, GDP per capita (US$, PPP) is entered in log values. Both graphs tend to reject the Easterlin paradox. Life satisfaction rises with per capita income. One reason Easterlin did not observe this relationship is the small sample of rich nations he had to work with. The graph using log values suggests that, in relative terms, life satisfaction increases with percentage changes in per capita incomes across the entire range of observed incomes. Although economic growth and happiness are correlated, within income categories (low, middle, and high) there appears to be much less of a trend than between them. Among any given income category the Easterlin paradox may hold.[19]

[19]Angus Deaton, "Income, Health, and Well-Being around the World: Evidence from the Gallup World Poll," *Journal of Economic Perspectives* 22, no. 2 (Spring 2008), 53-72; Betsey Stevenson and Justin Wolfers, "Economic Growth and Subjective Well-Being: Reassessing the Easterlin Paradox," *Brookings Papers on Economic Activity* 39, no. 1 (Spring 2008), 1-102.



(a)



(b)

FIGURE 2-4 Life Satisfaction as a Measure of Well-Being (2008)

Life satisfaction measures the mean level of life satisfaction of a random group of people who were asked the following question: "Please imagine a ladder with steps numbered from zero at the bottom to ten at the top. Suppose we say that the top of the ladder represents the best possible life for you, and the bottom of the ladder represents the worst possible life for you. On which step of the ladder would you say you personally feel you stand at this time, assuming that the higher the step the better you feel about your life, and the lower the step the worse you feel about it? Which step comes closest to the way you feel?"

Source: Gallup World Poll.

There is also variance around the trend line because more than income levels determine life satisfaction. Costa Rica and the United States both have mean levels of life satisfaction of around 7.2, but Costa Rica has only one-quarter the income of the United States; Korea is more than three times richer than Thailand, but both share similar levels of life satisfaction (around 6.1). For reasons other than income, Costa Ricans and Thais are more satisfied than are Americans and Koreans. One group of nations stands out in terms of lower life satisfaction than expected based on income alone. Countries in Europe and Central Asia almost always lie below the trend line. After accounting for income level, mean life satisfaction is systematically lower for these nations than it is in other regions. Much of this can be explained by the wrenching effects of the transition from planned to market economies. People who benefited from the former system, including those who had decent jobs or relied on pensions, were made worse off. Public goods deteriorated, inequality rose, and growth rates turned negative. All contributed to declining measures of average life satisfaction. There is some evidence that with the resumption of growth in many of these economies during the 2000s, levels of happiness are rising and falling more in line with other regions.[20]

Recent research suggests that happiness and income levels are correlated, implying that economic growth improves happiness. But even in those situations in which the relationship is less certain, a case for economic growth still can be made. More than half a century ago, W. Arthur Lewis, one of the pioneers of the field of development economics and a Nobel laureate, provided one. Lewis was writing before there was survey evidence on happiness and at a time when the distinction between the terms *economic growth* and economic development were not as nuanced as they are today. The concluding chapter of his 1955 book, *The Theory of Economic Growth,* is titled, "Is Economic Growth Desirable?" Lewis's answer: "The case for economic growth is that it gives man greater control over his environment, and thereby increases his freedom."[21]

SUMMARY

- Understanding the process of economic development requires methods of measuring economic performance across countries and over time. Gross domestic product (GDP) per capita is a measure of the aggregate value of national output and, despite a number of limitations, is the most common standard for measuring economic growth.
- For cross-country comparisons, GDP per capita is best measured in terms of purchasing power parity (PPP). PPP estimates are superior to

[20]Sergei Guriev and Ekaterina Zhuravskaya, "(Un)Happiness in Transition," *Journal of Economic Perspectives* 23, no. 2 (Spring 2009), 143–68.

[21]W. Arthur Lewis, *The Theory of Economic Growth* (Homewood, IL: Richard D. Irwin, 1955), p. 420–21.

comparisons based solely on market exchange rates. Market exchange rates tend to underestimate the GDP levels of poorer nations. This is because market exchange rates are based on traded goods and capital flows and fail to account for the much lower prices of nontraded goods in poor nations. The PPP estimates obtained from the UN International Comparison Program correct this problem by expressing every nation's GDP per capita in terms of a common set of international prices.

- Angus Maddison provides a broad overview of economic growth over the past 2,000 years. For most of this period and in most regions, growth in output was just about sufficient to match growth in population, resulting in more or less stagnant per capita incomes. According to Maddison, modern economic growth began only around 1820, with the escalation of growth rates in western Europe and its offshoots. These regions had achieved higher per capita income levels by 1500 but accelerated these differences, especially, over the last 190 years. Rapid growth rates began to characterize other regions, especially in Asia, only in the decades after 1950. As a result of these divergent patterns of economic growth, there is much greater disparity in world incomes today than in the past.
- Unlike economic growth, which is a relatively objective measure of economic capacity, economic development is a normative concept. Various scholars and organizations offer specific indicators or goals for achieving development. Prominent among these is the human development index (HDI), a composite measure reflecting the goals of leading a long life, acquiring knowledge, and achieving material well-being. The millennium development goals (MDGs) rely on a multiplicity of goals and targets for advancing human well-being within the decade.
- Analysis of the HDI and the MDGs reveals the centrality of economic growth to achieving both. HDI ranks are well correlated with per capita income levels, and differential performance in achieving specific MDGs often is tied to differential growth performance. But economic growth is not a panacea. Achieving economic development also involves questions of distribution and strategies to reach specific development targets.
- Citizens of rich nations can engage in a debate over whether further economic growth will advance their well-being, but this is not a meaningful debate for poor nations. Even if rising per capita incomes are not perfectly correlated with perceptions of happiness, economic growth and development are essential for poor nations as a means of increasing choices and advancing human capabilities and freedoms.