6

Population Growth and Economic Development: Causes, Consequences, and Controversies

Economic development may be far from "the best contraceptive" [that it is sometimes described as]…. On the other hand, social development—especially women's education and employment—can be very effective indeed.

—Amartya Sen, Nobel laureate in economics

6.1 The Basic Issue: Population Growth and the Quality of Life

In 2013, the world's population reached about 7.2 billion people. In that year, the United Nations Population Division projected that population would rise to about 8.1 billion in 2025 and reach about 9.6 billion by the year 2050. The overwhelming majority of that population will inhabit the developing world. What will be the economic and social implications for development if such projections are realized? Is this scenario inevitable, or will it depend on the success or failure of development efforts? Finally, even more significant, is rapid population growth per se as serious a problem as many people believe, or is it a manifestation of more fundamental problems of underdevelopment and the unequal utilization of global resources between rich and poor nations, as others argue?

In this chapter, we examine many of the issues relating population growth to economic development. We begin, however, by looking at historical and recent population trends and the changing geographic distribution of the world's people. After explaining basic demographic concepts, we present some well-known economic models and hypotheses regarding the causes and consequences of rapid population growth in contemporary developing countries. Controversies surrounding the significance of the population factor in general and these models and hypotheses in particular are then explored.

Finally, we evaluate a range of alternative policy options that developing countries may wish to adopt to influence the size and growth of their populations, as well as ways in which industrialized countries can contribute to a more manageable global population and resource environment. Population policies in China and India, the nations with the largest populations in the world, are the focus of this chapter's case study.

Every year, more than 75 million people are being added to the world's population. Almost all of this net population increase—97%—is in developing countries. Increases of such magnitude are unprecedented. But the problem of population growth is not simply a problem of numbers. It is a problem of human welfare and of development, as defined in Chapter 1. Rapid population growth can have serious consequences for the well-being of all humanity. If development entails the improvement in people's levels of living—their incomes, health, education, and general well-being—and if it also encompasses their capabilities, self-esteem, respect, dignity, and freedom to choose, then the really important question about population growth is this: How does the contemporary population situation in many developing countries contribute to or detract from their chances of realizing the goals of development, not only for the current generation but also for future generations? In addressing this central issue, we examine the reasons and consequences for the positive relationship between poverty and family size. More broadly, we examine what drives high population growth in developing (particularly low-income) countries, why population growth in general subsequently falls as countries grow and develop, and the causes and implications of these patterns.

6.2 Population Growth: Past, Present, and Future

World Population Growth throughout History

For most of human existence on earth, humanity's numbers have been few. When people first started to cultivate food through agriculture some 12,000 years ago, the estimated world population was no more than 5 million (see Table 6.1). Two thousand years ago, world population had grown to nearly 250 million, less than a fifth of the population of China today. From year 1 on our calendar to the beginning of the Industrial Revolution around 1750, it tripled to 728 million people, less than three-quarters of the total number living in India today. During the next 200 years (1750–1950), an additional 1.7 billion people were added to the planet's numbers. But in just four decades thereafter (1950–1990), the earth's human population more than doubled again, bringing the total figure to around 5.3 billion. The world entered the twenty-first century with over 6 billion people.

As seen in Figure 6.1, in 1950 about 1.7 billion people lived in developing countries, representing about two-thirds of the world total; by 2050, the population of less developed countries will reach over 8 billion, nearly seven-eighths of the world's population. In the corresponding period,

TABLE 6.1 Estimated World Population Growth

Year	Estimated Population (millions)	Estimated Annual Increase in the Intervening Period (%)	Doubling Time (years)
10,000 B.C.E.	5		
1 C.E.	250	0.04	1,733
1650	545	0.04	1,733
1750	728	0.29	239
1800	906	0.45	154
1850	1,171	0.53	130
1900	1,608	0.65	106
1950	2,576	0.91	76
1970	3,698	2.09	33
1980	4,448	1.76	39
1990	5,292	1.73	40
2000	6,090	1.48	47
2010	6,892	1.22	57
2050 (projected)	9,600	0.98	71

Sources: Population Reference Bureau, *World Population Data Sheet* (Washington, D.C.: Population Reference Bureau, 2010 and previous annuals); Warren S. Thompson and David T. Lewis, *Population Problems*, 5th ed. (New York: McGraw-Hill, 1965), p. 384; United Nations, *Demographic Yearbook for 1971* (New York: United Nations, 1971); United Nations, *Report on the World Social Situation, 1997* (New York: United Nations, 1997), p. 14; and United Nations Population Division, *World Population Prospects: The 2012 Revision*. New York: United Nations (2013). An alternate system of broadly comparable and earlier estimates is found in Michael Kremer, "Population growth and technological change: One million B.C. to 1990," *Quarterly Journal of Economics* 108 (1993): 681–716.

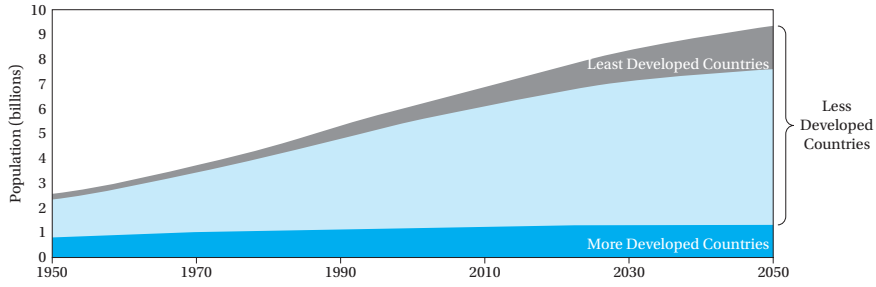
the population of the least developed countries will increase by tenfold, from about 200 million to 2 billion people. In contrast, the population of the developed countries will grow very little between now and 2050, even accounting for immigration from developing countries.

Turning from absolute numbers to percentage growth rates, for almost the whole of human existence on earth until approximately 300 years ago, population grew at an annual rate not much greater than zero (0.002%, or 20 per million). Naturally, this overall rate was not steady; there were many ups and downs as a result of natural catastrophes and variations in growth rates among regions. By 1750, the population growth rate had accelerated to 0.3% per year. By the 1950s, the rate had again accelerated, tripling to about 1.0% per year. It continued to accelerate until around 1970, when it peaked at 2.35%.[1] Today the world's population growth rate remains at a historically high rate of nearly 1.2% per year, but the rate of increase is slowing. However, the population growth rate in Africa is still an extremely high 2.3% per year. (Note that estimates of population numbers and growth rates differ according to research methods, but the broad trends are similar across major studies.)

Doubling time Period that a given population or other quantity takes to increase by its present size.

The relationship between annual percentage increases and the time it takes for a population to double in size, or **doubling time**,[2] is shown in the rightmost column of Table 6.1 (calculation of doubling time is explained in endnote 2). We see that before 1650, it took nearly 36,000 years, or about

FIGURE 6.1 World Population Growth, 1950–2050



Source: Population Reference Bureau World Population Data Sheet 2012, page 4; data are drawn from United Nations Population Division, World Population Prospects: The 2010 Revision (2011), medium-variant estimates.

1,400 generations, for the world population to double. Today it would take about 58 years, or two generations, for world population to double at current growth rates. Moreover, whereas it took 1,750 years to add 480 million people to the world's population between year 1 and the onset of the Industrial Revolution, this same number of people is today being added in less than 7 years.

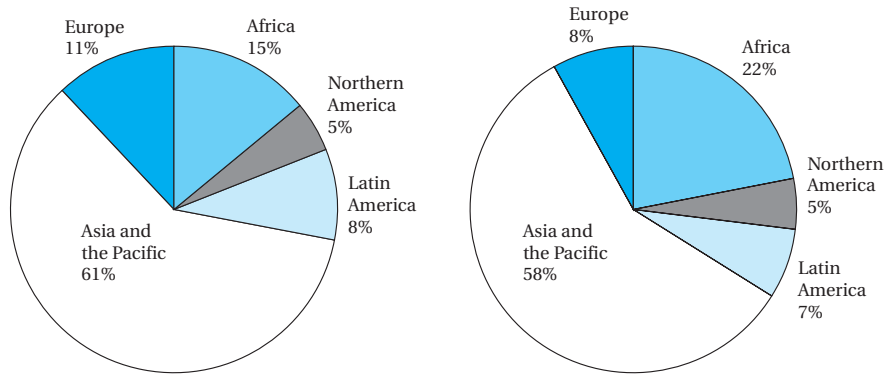
The reason for the sudden change in overall population trends is that for almost all of recorded history, the rate of population change, whether up or down, had been strongly influenced by the combined effects of famine, disease, malnutrition, plague, and war—conditions that resulted in high and fluctuating death rates. In the twentieth century, such conditions came increasingly under technological and economic control. As a result, human mortality (the death rate) is now lower than at any other point in human existence. It is this decline in mortality resulting from rapid technological advances in modern medicine, improved nutrition, and the spread of modern sanitation measures throughout the world, particularly within the past half-century, that has resulted in the unprecedented increases in world population growth, especially in developing countries. In short, population growth today is primarily the result of a rapid transition from a long historical era characterized by high birth and death rates to one in which death rates have fallen sharply but birth rates, especially in the least developed countries, have fallen more slowly from their historically high levels.

Structure of the World's Population

The world's population is very unevenly distributed by geographic region, by fertility and mortality levels, and by age structures.

Geographic Region More than three-quarters of the world's people live in developing countries; fewer than one person in four lives in an economically developed nation. Figure 6.2 shows the regional distribution of the world's population as it existed in 2010 and as it is projected for 2050.

FIGURE 6.2 World Population Distribution by Region, 2010 and 2050



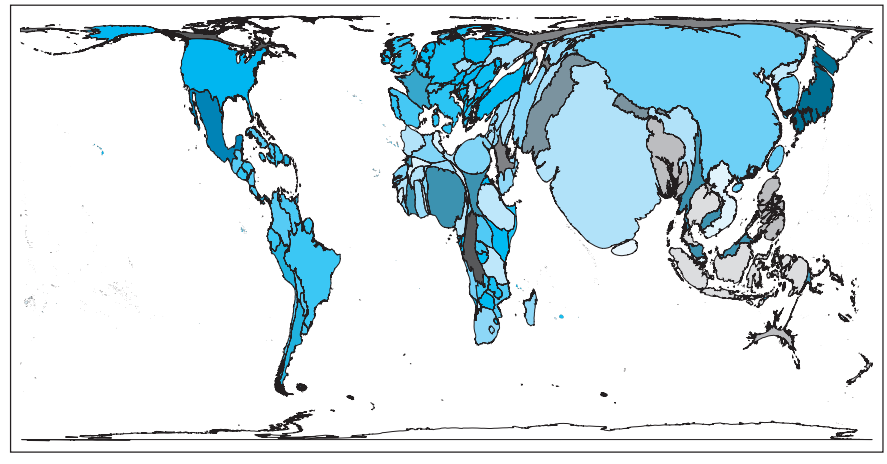
(a) Total population 2010: 6.89 billion

(b) Total population 2050: 9.5 billion

Source: Data from Population Reference Bureau, *World Population DataSheet*, 2010.

World population distribution is put into dramatic perspective by the map in Figure 6.3. Attention is drawn to the large size of India in comparison with Europe. China is bordered on the north and west by a thin strip of land that represents Russia. Mexico looms very large in comparison with Canada—a dramatic reversal of conventional maps; taken together, even the Caribbean islands are larger than Canada. Bangladesh, smaller in size than the state of Wisconsin, is larger than Germany and France combined. In Africa, the prominence of Nigeria stands out. Indonesia, which gets comparatively little

FIGURE 6.3 Map with Country Sizes Proportional to Their Fraction of World Population



Source: worldmapper.org:http://www.worldmapper.org/display.php?selected=2).

international attention, dwarfs its neighbor Australia while appearing nearly as large as the United States.

Fertility and Mortality Trends The **rate of population increase** is quantitatively measured as the percentage yearly net relative increase (or decrease, in which case it is negative) in population size due to **natural increase** and **net international migration**. Natural increase simply measures the excess of births over deaths or, in more technical terms, the difference between fertility and mortality. Net international migration is of very limited, though growing, importance today (although in the nineteenth and early twentieth centuries it was an extremely important source of population increase in North America, Australia, and New Zealand and corresponding relative decrease in western Europe). Population increases in developing countries therefore depend almost entirely on the difference between their **crude birth rates** (or simply **birth rates**) and **death rates**.

Rate of population increase The growth rate of a population, calculated as the natural increase after adjusting for immigration and emigration.

Natural increase The difference between the birth rate and the death rate of a given population.

Net international migration The excess of persons migrating into a country over those who emigrate from that country.

Crude birth rate The number of children born alive each year per 1,000 population (often shortened to *birth rate*).

Death rate The number of deaths each year per 1,000 population.

Total fertility rate (TFR) The number of children that would be born to a woman if she were to live to the end of her childbearing years and bear children in accordance with the prevailing age-specific fertility rates.

Recall from Chapter 2 that most developing nations have birth rates ranging from 15 to 45 per 1,000. By contrast, in almost all developed countries, the rate is less than 15 per 1,000. Moreover, developing country birth rates today are still often higher than they were in preindustrial western Europe. But there has been a substantial decline in fertility over the past three decades, not only in countries like Taiwan, South Korea, and China, where rapid economic and social development have taken place, but also in nations where economic growth has been less rapid, including Mexico and Bangladesh, and in some where growth has stagnated, such as Zimbabwe. The **total fertility rate (TFR)**—the average number of children a woman would have, assuming that current age-specific birth rates remain constant throughout her childbearing years—has fallen dramatically in many countries since 1970, as the examples in Table 6.2 demonstrate, but remains high in sub-Saharan Africa (5.1 in 2012) and western Asia (2.9). Niger with 7.1 and Afghanistan with 6.2 were among the highest in the world.[3]

Modern vaccination campaigns against malaria, smallpox, yellow fever, and cholera as well as the proliferation of public health facilities, clean water supplies, improved nutrition, and public education have all worked together over the past three decades to lower death rates by as much as 50% in parts of Asia and Latin America and by over 30% in much of Africa and the Middle East. Death rates have fallen for all age groups. Nevertheless, the average life span remains about 12 years greater in the developed countries. This gap has been sharply reduced in recent decades. For example, in 1950, **life expectancy at birth** for people in developing countries averaged 35 to 40 years, compared with 62 to 65 years in the developed world. Considerable progress has been made on reducing the **under-5 mortality rate**. For example, according to UN compilations between 1990 and 2008, it fell from 121 per 1,000 to 74 per 1,000 in South Asia, from 73 to 38 per 1,000 in Southeast Asia and from 52 to 23 per 1,000 in Latin America and the Caribbean. Although the under-5 mortality rate declined from 184 to 144 per 1,000 in sub-Saharan Africa in this period, progress in the region continued to lag. In 2009, because of still relatively high under-5 mortality rates and the AIDS epidemic, sub-Saharan Africa had the lowest life expectancy, 51 years, while in the high-income countries, life expectancy at birth averaged nearly 78 years. In East Asia and Latin America, life

Life expectancy at birth The number of years a newborn child would live if subjected to the mortality risks prevailing for the population at the time of the child's birth.

Under-5 mortality rate Deaths among children between birth and 5 years of age per 1,000 live births.

TABLE 6.2 Fertility Rate for Selected Countries, 1970 and 2009

Country	Total Fertility Rate	
	1970	2012
Bangladesh	7.0	2.3
Colombia	5.3	2.1
Indonesia	5.5	2.3
Jamaica	5.3	2.1
Mexico	4.9	2.3
Thailand	5.5	1.6
Zimbabwe	7.7	4.1

Sources: World Bank, *World Development Report, 1994* (New York: Oxford University Press, 1994), tab. 26; Population Reference Bureau, *World Population Data Sheet* (Washington, D.C.: Population Reference Bureau, 2012).

expectancies have now reached an impressive 74 and 73 years, respectively. Finally, note that there remains a biological susceptibility for old people to die at higher rates than young people due to aging. Although death rates of children and younger people are higher on average in a developing country with rapid population growth, the fact that their populations are so youthful on average explains why they may have an overall population-average death rate that is lower than that of a developed country with a much older average population. You may notice this possibly unexpected relationship when you look at demographic statistics.

Some of the striking population projections issued by the United Nations in 2013 are reported in Box 6.1.

Age Structure and Dependency Burdens Population is relatively youthful in the developing world. As of 2011, children under the age of 15 constitute more than 40% of the total population of the low-income countries, 32% of the lower-middle income countries, but just 17% of high-income countries.[4] In countries with such an age structure, the **youth dependency ratio**—the proportion of youths (under age 15) to economically active adults (ages 15 to 64)—is very high. Thus, the workforce in developing countries must support almost twice as many children as it does in the wealthier countries. In the United Sates, the workforce age group (15 to 64) amounts to about 67% of the total population, with 20% under age 15 and 13% over age 65 as of 2011; the corresponding ratios in the United Kingdom are similar: 66%, 18%, and 17% respectively. In the euro area, some 19% of the population is over age 65; and in Japan nearly one-quarter of the population already has reached age 65. The main problems in more developed countries relate more to their low population growth and old-age dependents (over age 65). By contrast, in sub-Saharan Africa, the economically active workforce makes up about 54% of the total population (just 3% of the population is over age 65) as of 2011. In general, the more rapid the population growth rate is, the greater the proportion of dependent children in the total population and the more difficult it is for people who

Youth dependency ratio The proportion of young people under age 15 to the working population aged 16 to 64 in a country.

BOX 6.1 FINDINGS The 2012 Revised United Nations Population Projections

Here is a summary of some of the main findings found in the UN's *World Population Prospects 2012 Revision,* published in June 2013.

- World population is now projected at 8.1 billion by 2025; and 9.6 billion by 2050.
- Most population growth will continue to occur in developing regions where population will grow from 5.9 billion in 2013 to about 8.2 billion in 2050.
- "Give or take a billion": The projections depend on assumptions—the 2050 population could turn out to be as little as 8.3 billion or as many as 10.9 billion.
- Most population growth will occur in Africa.
- The 49 least developed countries are projected to double in size from 900 million in 2013 to 1.8 billion in 2050.
- Beyond Africa, projected population growth in the rest of world is just over 10% for 2013–2100.
- New projected total population is higher, particularly after 2075 because:
  - Current fertility level estimates are higher in some countries with better information (in particular, in 15 high-fertility sub-Saharan African countries, estimated births per woman were adjusted upwards more than 5%).
  - In some cases, the actual level of fertility appears to have risen in recent years.
  - In other cases, the previous estimate was too low.
- Other projections include:
  - Developed region population will be little changed at 1.3 billion–even with immigration.
  - India will become the world's most populous country, passing China around 2028, when each will have about 1.45 billion people.
  - The population of Nigeria could pass that of the United States by 2050; by 2100 it could rival China as the second most populous country.
  - By 2100, several other countries are projected to have populations over 200 million: Indonesia Tanzania, Pakistan, Congo, Ethiopia, Uganda, and Niger.

Source: United Nations Population Division, World Population Prospects: The 2012 Revision. New York: United Nations, Department of Economic and Social Affairs, 13 June 2013; downloaded from www.unpopulation.org. For a summary see http://www.un.org/apps/news/story.asp?NewsID=45165#.UlAkZmRVRz0.

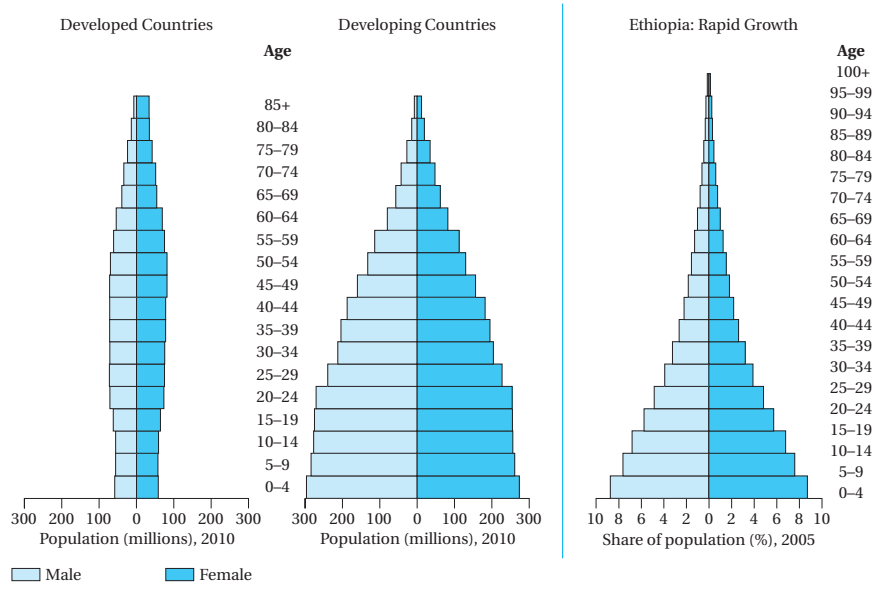
are working to support those who are not. This phenomenon of youth dependency also leads to an important concept, the **hidden momentum of population growth**.

Hidden momentum of population growth The phenomenon whereby population continues to increase even after a fall in birth rates because the large existing youthful population expands the population's base of potential parents.

The Hidden Momentum of Population Growth

Perhaps the least understood aspect of population growth is its tendency to continue even after birth rates have declined substantially. Population growth has a built-in tendency to continue, a powerful momentum that, like a speeding automobile when the brakes are applied, tends to keep going for some time before coming to a stop. In the case of population growth, this momentum can persist for decades after birth rates drop.

FIGURE 6.4 Population Pyramids: All Developed and Developing Countries and the Case of Ethiopia



Source: Graphs detailing Developed Countries from *World Population Data Sheet of the Population Reference Bureau, Inc.,* by Population Reference Bureau. Copyright 2010 by Population Reference Bureau, Inc. Reproduced with permission of Population Reference Bureau, Inc., via Copyright Clearance Center. Graph detailing Ethiopia from *Population Bulletin* 62 (2007), p. 6. Reprinted with permission from Population Reference Bureau, Inc.

There are two basic reasons for this. First, high birth rates cannot be altered substantially overnight. The social, economic, and institutional forces that have influenced fertility rates over the course of centuries do not simply evaporate at the urging of national leaders. We know from the experience of European nations that such reductions in birth rates can take many decades. Consequently, even if developing countries assign top priority to the limitation of population growth, it will still take many years to lower national fertility to desired levels.

The second and less obvious reason for the hidden momentum of population growth relates to the age structure of many developing countries' populations. Figure 6.4 illustrates the great difference between age structures in less developed and more developed countries by means of two **population pyramids** for 2010. Each pyramid rises by five-year age intervals for both males and females, with the total number in each age cohort measured on the horizontal axis. Panel A (the left and middle panels) show population pyramids for developed and developing countries, respectively (the age scale is that listed between these two figures). Expressed in millions of people, rather than percentages, the figure clearly reveals that most future population growth will take place in the developing world. The steeper bottom rungs for the developing world as a whole, in contrast to a very low-income country such as Ethiopia (right panel),

Population pyramid A graphic depiction of the age structure of the population, with age cohorts plotted on the vertical axis and either population shares or numbers of males and females in each cohort on the horizontal axis.

reflect the large declines in population growth in lower-middle income developing countries over the past quarter century, and particularly in China (see the case study at the end of this chapter). For developed countries, in the contemporary period the population in middle cohorts is typically greater than that of young cohorts; this is partly but certainly not exclusively viewed as a transitional feature of a period in which women have been delaying births until later in life.

From the Ethiopia pyramid (Panel B) expressed as share of population, young people greatly outnumber their parents (the age scale in this case is found to the right of the figure). When their generation reaches adulthood, the number of potential parents will inevitably be much larger than at present. It follows that even if these new parents have only enough children to replace themselves (two per couple, as compared with their parents, who may have had four or more children), the fact that the total number of couples having two children is much greater than the number of couples who previously had more children means that the total population will still increase substantially before leveling off.[5]

Panel A also focuses attention on the fact that some age brackets are increasing in size in some countries, while they are decreasing in others. This reflects that in the demographic transition, the fraction of the population of working age first rises and then falls. On the one hand, countries where the fraction of prime working-age citizens is rising face a potential crisis if many remain unemployed, as this is associated with inequality and (especially among males) social unrest, not to mention the potential output loss. On the other hand, this rise is also an important window of opportunity for strong income and productivity gains, referred to as the *demographic dividend*—a period in which there are fewer children to support, a larger fraction of women join or remain in the workforce for longer periods of time, and there are more available resources to invest in human capital (see Chapter 8).

In contrast, where the fraction of people of working age is falling as a result of population aging, the resources needed for old-age support are increasing. This is already a challenge for most high-income countries. Leading up to this period, a higher savings rate is required; but then allowing more immigration can also help. The transition is likely to pose an even greater challenge for some middle-income countries with big drops in fertility ahead of previous historical patterns, most notably China (see the case study at the end of the chapter), but also in several other Asian countries.[6]

6.3 The Demographic Transition

The process by which fertility rates eventually decline to low and stable levels has been portrayed by a famous concept in economic demography called the **demographic transition**.

Demographic transition The phasing-out process of population growth rates from a virtually stagnant growth stage, characterized by high birth rates and death rates through a rapid-growth stage with high birth rates and low death rates to a stable, low-growth stage in which both birth and death rates are low.

The demographic transition attempts to explain why all contemporary developed nations have more or less passed through the same three stages of modern population history. Before their economic modernization, these countries for centuries had stable or very slow-growing populations as a result of a combination of high birth rates and almost equally high death rates. This was stage 1. Stage 2 began when modernization, associated with better

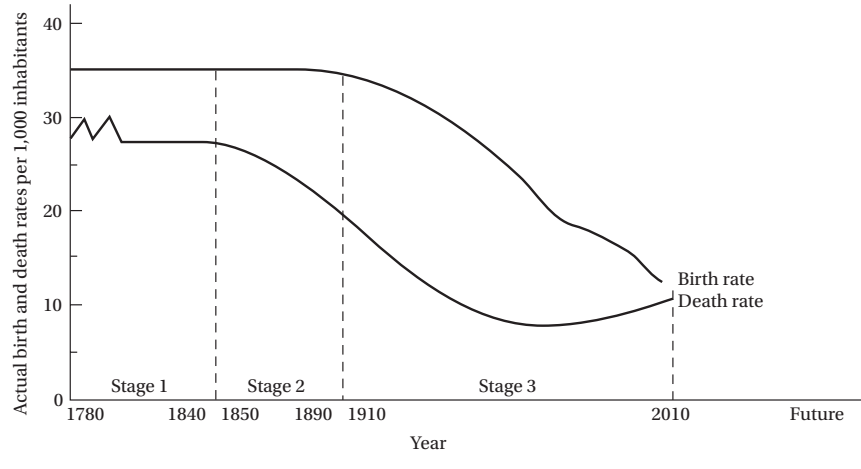
public health methods, healthier diets, higher incomes, and other improvements led to a marked reduction in mortality that gradually raised life expectancy from under 40 years to over 60 years. However, the decline in death rates was not immediately accompanied by a decline in fertility. As a result, the growing divergence between high birth rates and falling death rates led to sharp increases in population growth compared to past centuries. Stage 2 thus marks the beginning of the demographic transition (the transition from stable or slow-growing populations first to rapidly increasing numbers and then to declining rates). Finally, stage 3 was entered when the forces and influences of modernization and development caused the beginning of a decline in fertility; eventually, falling birth rates converged with lower death rates, leaving little or no population growth.

Replacement fertility The number of births per woman that would result in stable population levels.

This process implies movement from a relatively high number of births per woman to a population **replacement fertility** level that can be calculated to reach about 2.05 to 2.1 births per woman when nearly all women survive to the mean age of childbearing, as they do in developed countries. In developing countries with much lower survival rates, replacement fertility can be well over 3 births per woman.[7]

Figure 6.5 depicts the three historical stages of the demographic transition in western Europe. Before the early nineteenth century, birth rates hovered around 35 per 1,000, while death rates fluctuated around 30 per 1,000. This resulted in population growth rates of around 5 per 1,000, or less than 0.5% per year. Stage 2, the beginning of western Europe's demographic transition, was initiated around the first quarter of the nineteenth century by slowly falling death rates as a result of improving economic conditions and the gradual development of disease and death control through modern medical and public health technologies. The decline in birth rates (stage 3) did not really begin until late in the nineteenth century, with most of the reduction many decades occurring after modern economic growth had begun and long after death rates began their descent. But since the initial level of birth rates was generally low

FIGURE 6.5 The Demographic Transition in Western Europe



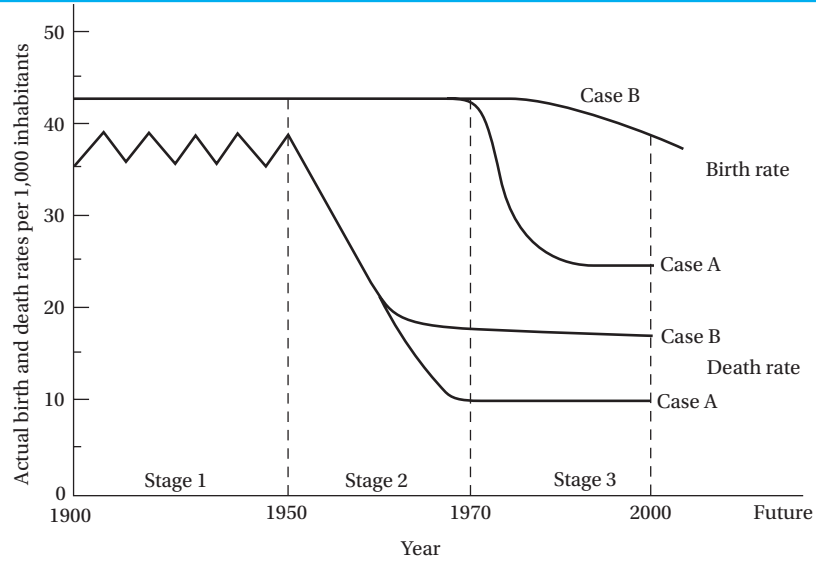
in western Europe as a result of either late marriage or celibacy, overall rates of population growth seldom exceeded the 1% level, even at their peak. By the end of western Europe's demographic transition in the second half of the twentieth century, the relationship between birth and death rates that marked the early 1800s had reversed, with birth rates fluctuating and death rates remaining fairly stable or rising slightly. This latter phenomenon was simply due to the older age distributions of contemporary European populations. The patterns of the demographic transition in Europe are clear, though research continues to better identify the causal factors at work.[8]

Figure 6.6 shows the population histories of contemporary developing countries, which contrast with those of western Europe and fall into two patterns.

Birth rates in many developing countries today are considerably higher than they were in preindustrial western Europe. This is because women tend to marry at an earlier age. As a result, there are both more families for a given population size and more years in which to have children. In the 1950s and 1960s, stage 2 of the demographic transition occurred throughout most of the developing world. The application of highly effective imported modern medical and public health technologies caused death rates in developing countries to fall much more rapidly than in nineteenth-century Europe. Given their historically high birth rates (still over 35 per 1,000 in many countries), this has meant that stage 2 of the demographic transition has been characterized by peak population growth rates well in excess of 2.0% per annum in most developing countries.

With regard to stage 3, we can distinguish between two broad classes of developing countries. In case A in Figure 6.6, modern methods of death

FIGURE 6.6 The Demographic Transition in Developing Countries



Source: Based on National Academy of Sciences, *The Growth of World Population* (Washington, D.C.: National Academy of Sciences, 1963), p. 15.

control, combined with rapid and widely distributed rises in levels of living, have resulted in death rates falling as low as 10 per 1,000 and birth rates also falling rapidly, to levels between 12 and 25 per 1,000. These countries, including Taiwan, South Korea, Costa Rica, China, Cuba, Chile, and Sri Lanka, have thus entered stage 3 of their demographic transition and have experienced rapidly falling rates of overall population growth.

But some developing countries fall into case B of Figure 6.6. After an initial period of rapid decline, death rates have failed to drop further, largely because of the persistence of widespread absolute poverty and low levels of living and more recently because of the AIDS epidemic. Moreover, the continuance of still quite high birth rates as a result of these low levels of living causes overall population growth rates to remain relatively high. These countries, including many of those in sub-Saharan Africa and the Middle East, are still in stage 2 of their demographic transition. Though fertility is declining, it remains very high in these parts of the world.

The important question, therefore, is this: When and under what conditions are developing nations likely to experience falling birth rates and a slower expansion of population? To answer this question, we need to ask a prior one. What are the principal determinants or causes of high fertility rates in developing countries, and can these determinants of the "demand" for children be influenced by government policy? To try to answer this critical question, we turn to a very old and famous classical macroeconomic and demographic model, the Malthusian "population trap," and a contemporary and highly influential neoclassical microeconomic model, the household theory of fertility.

6.4 The Causes of High Fertility in Developing Countries: The Malthusian and Household Models

The Malthusian Population Trap

More than two centuries ago, the Reverend Thomas Malthus put forward a theory of the relationship between population growth and economic development that is influential today. Writing in his 1798 *Essay on the Principle of Population* and drawing on the concept of diminishing returns, Malthus postulated a universal tendency for the population of a country, unless checked by dwindling food supplies, to grow at a geometric rate, doubling every 30 to 40 years.[9] At the same time, because of diminishing returns to the fixed factor, land, food supplies could expand only at a roughly arithmetic rate. In fact, as each member of the population would have less land to work, his or her marginal contribution to food production would actually start to decline. Because the growth in food supplies could not keep pace with the burgeoning population, per capita incomes (defined in an agrarian society simply as per capita food production) would have a tendency to fall so low as to lead to a stable population existing barely at or slightly above the subsistence

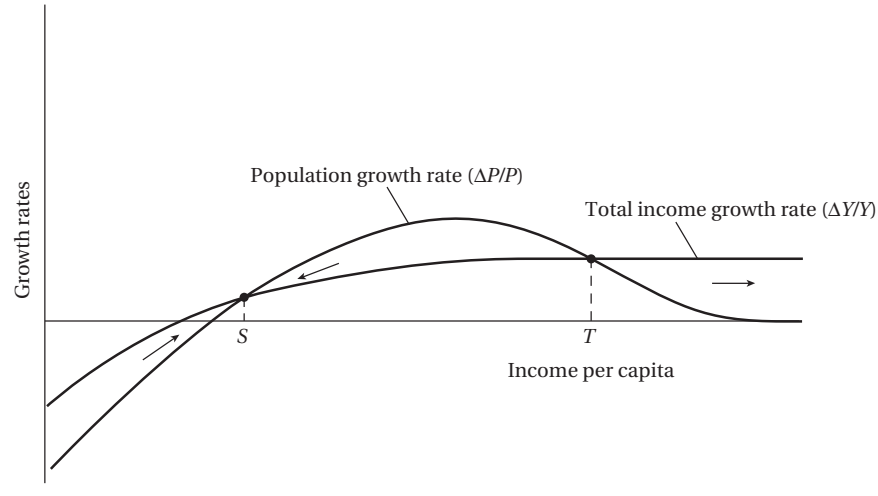
level. Malthus therefore contended that the only way to avoid this condition of chronic low levels of living or absolute poverty was for people to engage in "moral restraint" and limit the number of their progeny. Hence, we might regard Malthus, indirectly and inadvertently, as the father of the modern birth control movement.

Modern economists have given a name to the Malthusian idea of a population inexorably forced to live at subsistence levels of income. They have called it the *low-level equilibrium population trap* or, more simply, the **Malthusian population trap**. Diagrammatically, the basic Malthusian model can be illustrated by comparing the shape and position of curves representing population growth rates and aggregate income growth rates when these two curves are each plotted against levels of per capita income. An example of this is presented in Figure 6.7.

Malthusian population trap The threshold population level anticipated by Thomas Malthus (1766–1834) at which population increase was bound to stop because life-sustaining resources, which increase at an arithmetic rate, would be insufficient to support human population, which would increase at a geometric rate.

On the vertical axis, we plot numerical percentage changes, both positive and negative, in the two principal variables under consideration (total population and aggregate income). On the horizontal axis are levels of per capita income. Figure 6.7 depicts the basic ideas. The x-axis shows the level of income per capita. The y-axis shows two rates—of population growth and of total income growth. Per capita income growth is, by definition, the difference between income growth and population growth—hence the vertical difference between these two curves. Thus, as we saw in Chapter 3 in our discussion of the Harrod-Domar (or AK) model, whenever the rate of total income growth is greater than the rate of population growth, income per capita is rising; this corresponds to moving to the right along the x-axis. Conversely, whenever the rate of total income growth is less than the rate of population growth, income per capita is falling, moving to the left along the x-axis. When these rates are equal, income per capita is unchanging. We can then explore the shapes of population growth and growth of income to understand potential implications of this relationship.

FIGURE 6.7 The Malthusian Population Trap



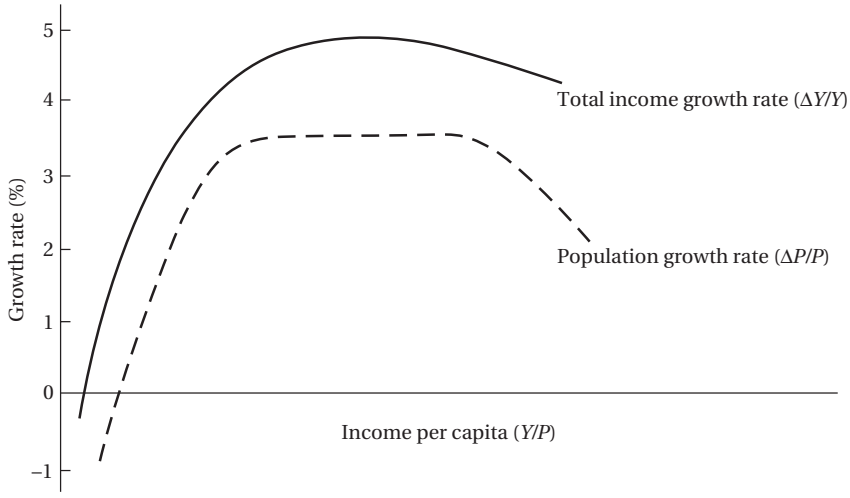
First consider population growth. When income is very low, say, below $250 per year at purchasing power parity, nutrition is so poor that people become susceptible to fatal infectious diseases; pregnancy and nursing become problematic; and, ultimately, outright starvation may occur. This is shown on the left in Figure 6.7. But after this minimum level of income per capita is reached, population begins to grow, eventually reaching a peak rate (perhaps at 3% to 4% per year); and then the population growth rate begins to fall until at last a fairly stable population is reached (a growth rate close to zero). Note that this pattern of population growth first increasing and then decreasing as per capita income rises corresponds to the pattern of the demographic transition, explained in section 6.3.

In Figure 6.7, total income growth becomes greater as the economy develops (and income per capita rises). An economic reason for this positive relationship is the assumption that savings vary positively with income per capita. Countries with higher per capita incomes are assumed to be capable of generating higher savings rates and thus more investment. Again, given a Harrod-Domar-type model of economic growth (see Chapter 3), higher savings rates mean higher rates of aggregate income growth. Eventually, however, growth levels off at a maximum. (Incomes of middle-income countries might grow fastest as they borrow technology to catch up—not shown in this diagram—but these higher rates cannot be continued once the technology frontier is reached.)

As drawn, the curves first cross at a low level of income, labeled S (for subsistence). This is a stable equilibrium: If per capita income levels become somewhat larger than (to the right of) S, it is assumed that population size will begin to increase in part because higher incomes improve nutrition and reduce death rates. But then, as shown in the figure, population is growing faster than income (the $\Delta P/P$ curve is vertically higher than the $\Delta Y/Y$ curve), so income per capita is falling, and we move to the left along the x-axis. The arrow pointing in the direction of S from the right therefore shows per capita income falling back to this very low level. On the other hand, if income per capita were a little less than S, the total income curve would be above the population growth curve and so income per capita would be rising. This corresponds to a move to the right along the x-axis. Thus, our conclusion is that point S represents a stable equilibrium (much as in our study of stable equilibria in Figure 4.1). This very low population growth rate along with a very low income per person is consistent with the experience of most of human history prior to the modern era.[10]

According to modern-day neo-Malthusians, poor nations will never be able to rise much above their subsistence levels of per capita income unless they initiate preventive checks (birth control) on their population growth. In the absence of such preventive checks, Malthusian positive checks (starvation, disease, wars) on population growth will inevitably provide the restraining force. However, if per capita income can somehow reach a threshold level, labeled T in Figure 6.7, from that point population growth is less than total income growth, and thus per capita income grows continually, at a rate such as 2% per year (the approximate U.S. per capita growth rate from 1870 to 2010).

FIGURE 6.8 How Technological and Social Progress Allows Nations to Avoid the Population Trap



Countries or regions in such a population trap can also escape it by achieving technological progress that shifts the income growth rate curve up at any level of per capita income. And it may be able to achieve changes in economic institutions and culture ("social progress") that shifts the population growth curve down. In this way, the population trap equilibrium is eliminated altogether, and the economy is able to proceed with self-sustaining growth. An example of such a result is depicted in Figure 6.8. Total income growth is now greater than population growth at each level of per capita income. As a result, income per capita now grows steadily.

We have examined strategies for accelerating income growth in Chapters 3 (including its appendices) and 4, and we will examine specific growth policies further in Chapters 7, 9, 12, and 14. The main focus of the remainder of this chapter is on changes in economic institutions, economic power in households, and cultural norms, to reduce fertility to maintain population growth below income growth, and eventually to achieve population stability.

In addition to the classic Malthusian model, the multiple equilibrium analysis of Chapter 4, Figure 4.1, is also relevant to understanding high-fertility traps. In the diagram, we can take the x-axis to represent (expected) fertility and the y-axis, the family's own fertility decision. The upward-sloping response (along the S-shaped curve) of the individual family fertility decision to average fertility may be caused by at least two important complementarities—a basis for possible multiple equilibria. First, if others have high fertility, this may increase the number of formal-sector job seekers without (proportionally) increasing the number of (higher-paying) formal-sector jobs. Each family may feel it needs a larger number of children to raise the probability that at least

one child will get a modern job. In addition, families often follow local social norms about fertility and tend to model their own behavior on the behavior of others in their community.

It is plausible that the resulting positively sloped response curve also has an S-shape, similar to the one in Figure 4.1[10a]. If the fertility response curve cuts the 45-degree line from above at least twice, then there are at least two stable equilibria (see Chapter 4, section 4.2): one with high and another with low levels of average fertility.[11] Some findings on the effects of changing norms on fertility decisions is presented in Box 6.2.

BOX 6.2 FINDINGS Social Norms and the Changing Patterns of Fertility in Bangladesh

In this chapter, we describe an idea—presented in part by Partha Dasgupta—that social norms play a role in setting an equilibrium fertility rate: If families followed local customs about fertility—modeling their own behavior on that of their neighbors—the community might be trapped at a higher fertility rate than would prevail if they could manage a change in social expectations. The idea was also a starting point for empirical research by Kaivan Munshi and Jacques Myaux on the uneven transition to lower fertility in rural developing areas.

Munshi and Myaux applied their research to the experience of the Matlab area of Bangladesh. Fertility reduction varied greatly across apparently similar villages. In addition, response to the same family-planning program also varied greatly in the magnitude of their effects and time lags before these effects were realized. Data on fertility collected twice annually over an 11-year period offered a unique chance to learn about this process. (The data set included contraceptive use and demographic and socioeconomic characteristics for all women living in all 70 villages in the Matlab area who took part in the program and were followed throughout the 11-year period.)

Munshi and Myaux offered an explanation for widely varying local patterns: "Most societies have traditionally put norms into place to regulate fertility. When the economic environment changes, individuals gradually learn through their social interactions about the new reproductive equilibrium that will emerge in their community." In this case, the change was in the availability of modern contraception. There is likely some proportion of people who will be perpetually resistant to contraception; the remainder will be open-minded about it but may not want to behave too differently than local norms dictate. Until this process plays out, people will not know how many of their neighbors will be firmly resistant to change and thus whether contraceptive use will ultimately be socially acceptable overall. Munshi and Myaux propose that families' uncertainty about what potential new equilibrium (what level of contraceptive prevalence) in their villages will emerge leads to caution, giving rise to slow and different rates of fertility transition in otherwise apparently similar villages. They developed a model to demonstrate the underlying logic of this explanation and concluded that social norms do make a difference; the process of moving to a better equilibrium can be slow. In some cases, movement out of the high fertility equilibrium (too high for many who are stuck there) can be prevented indefinitely.

In rural Bangladesh, which has a large majority Muslim population but also a minority Hindu population, social norms correspond to religious groups. Women are secluded generally (through purdah) and almost never interact with anyone (including women) from another religious group.

In this context, the researchers studied an "exogenous economic intervention"—a thorough, long-term family-planning program introduced throughout the village areas, studied and promoted door to door to each religious group with equal intensity. This is the kind of quasi experiment needed to understand the effects of social interactions, a process of wide importance in development economics and one that presents great challenges for econometrics (statistical analysis). The authors examined the data and showed that a woman's contraception use "respond[s] strongly to contraceptive prevalence within their own religious group in the village, cross-religion effects are entirely absent in the data." This held despite the fact that "all individuals in the village have access to the same family-planning inputs" and even when the people are otherwise very similar. Thus, the findings are "consistent with the view that changing social norms are driving changes in reproductive behavior in these communities. "As in the model, uncertainty about the ultimate prevalence of contraception use "is slowly resolved over time as women in the village interact sequentially with each other from one period to the next, which explains the gradual change in contraceptive prevalence that we see in the data, as well as the convergence to different levels of contraceptive use across communities."

As societies gain the possibility of modern economic development, advantages of smaller family sizes grow both for families and for the societies of which they are a part. But multiple equilibria are possible. Many in communities with full knowledge of and access to contraception may still perpetuate high fertility rates when social norms and sanctions to contrary behavior prevail. Addressing situations like these requires attention to social aspects of the development process.

Source: Kaivan Munshi and Jacques Myaux, "Social norms and the fertility transition," *Journal of Development Economics* 80 (2006): 1–38. For further background on the issues involved, see also Partha Dasgupta, *An Inquiry into Well-Being and Destitution* (New York: Oxford University Press, 1993).

Criticisms of the Malthusian Model

The Malthusian population trap provides a theory of the relationship between population growth and economic development. Unfortunately, it is based on a number of simplistic assumptions and hypotheses that do not stand the test of empirical verification. We can criticize the population trap on two major grounds.

First, the model ignores the enormous impact of technological progress in offsetting the growth-inhibiting forces of rapid population increases. As we saw in Chapter 2, the history of modern economic growth has been closely associated with rapid technological progress in the form of a continuous series of scientific, technological, and social inventions and innovations. Increasing rather than decreasing returns to scale have been a distinguishing feature of the modern growth epoch. While Malthus was basically correct in assuming a limited supply of land, he did not—and in fairness could not at that time—anticipate the manner in which technological progress could augment the availability of land by raising its quality (its productivity) even though its quantity might remain roughly the same.

In terms of the population trap, rapid and continuing technological progress can be represented by an upward shift of the income growth (total product) curve so that at *all* levels of per capita income, it is vertically higher than

the population growth curve. This is shown in Figure 6.8. As a result, per capita income will continue to grow over time. All countries therefore have the potential of escaping the Malthusian population trap.

The second basic criticism of the trap focuses on its assumption that national rates of population increase are directly (positively) related to the level of national per capita income. According to this assumption, at relatively low levels of per capita income, we should expect to find population growth rates increasing with increasing per capita income. But research indicates that there appears to be no clear correlation between population growth rates and levels of per capita income. As a result of modern medicine and public health programs, death rates have fallen rapidly and have become less dependent on the level of per capita income. Moreover, birth rates seem to show no rigid relationship with per capita income levels. Fertility rates vary widely for countries with the same per capita income, especially below $1,000. It is not so much the aggregate level of per capita income that matters for population growth but rather how that income is distributed. It is the level of household income, not the level of per capita income, that seems to matter most.

In sum, Malthusian and neo-Malthusian theories as applied to contemporary developing nations have severely limited relevance for the following reasons:

1. They do not take adequate account of the role and impact of technological progress.
2. They are based on a hypothesis about a macro relationship between population growth and levels of per capita income that does not stand up to empirical testing of the modern period.
3. They focus on the wrong variable, per capita income, as the principal determinant of population growth rates. A much better and more valid approach to the question of population and development centers on the microeconomics of family size decision making in which individual, and not aggregate, levels of living become the principal determinant of a family's decision to have more or fewer children.

We continue to study the Malthusian trap even though evidence shows that it is not currently relevant for three main reasons: First, because many people still believe it holds in poor countries today, despite the recent evidence; and people working in the development field should understand the model and the elements of it that do not currently apply so that they can engage the debate effectively. Second, because it seems clear that such traps have occurred in the historical past and may have been factors in population collapses, including in the pre-Columbian Americas. Third—as we will explore in the remainder of this chapter—the fact that this model no longer applies underlines the importance of factors that can prevent its emergence. These include efforts to continue steady and sustainable rises in agricultural productivity; moreover, they encompass increases in women's empowerment and freedom to choose—along with their incomes—which reduce the old-age security motive behind high fertility.

The Microeconomic Household Theory of Fertility

In recent years, economists have begun to look more closely at the microeconomic determinants of family fertility in an attempt to provide a better theoretical and empirical explanation for the observed falling birth rates associated with stage 3 of the demographic transition. In doing this, they have drawn on the traditional neoclassical theory of household and consumer behavior for their basic analytical model and have used the principles of economics and optimization to explain family size decisions.

The conventional theory of consumer behavior assumes that an individual with a given set of tastes or preferences for a range of goods (a "utility function") tries to maximize the satisfaction derived from consuming these goods subject to his or her own income constraint and the relative prices of all goods. In the application of this theory to fertility analysis, children are considered as a special kind of consumption (and in developing countries, particularly low-income countries, investment) good so that fertility becomes a rational economic response to the consumer's (family's) demand for children relative to other goods. The usual income and substitution effects are assumed to apply. That is, if other factors are held constant, the desired number of children can be expected to vary directly with household income (this direct relationship may not hold for poor societies; it depends on the strength of demand for children relative to other consumer goods and to the sources of increased income, such as female employment), inversely with the price (cost) of children, and inversely with the strength of tastes for other goods relative to children. Mathematically, these relationships can be expressed as follows:

$$C_d = f(Y, P_c, P_x, t_x), x = 1, \ldots, n \tag{6.1}$$

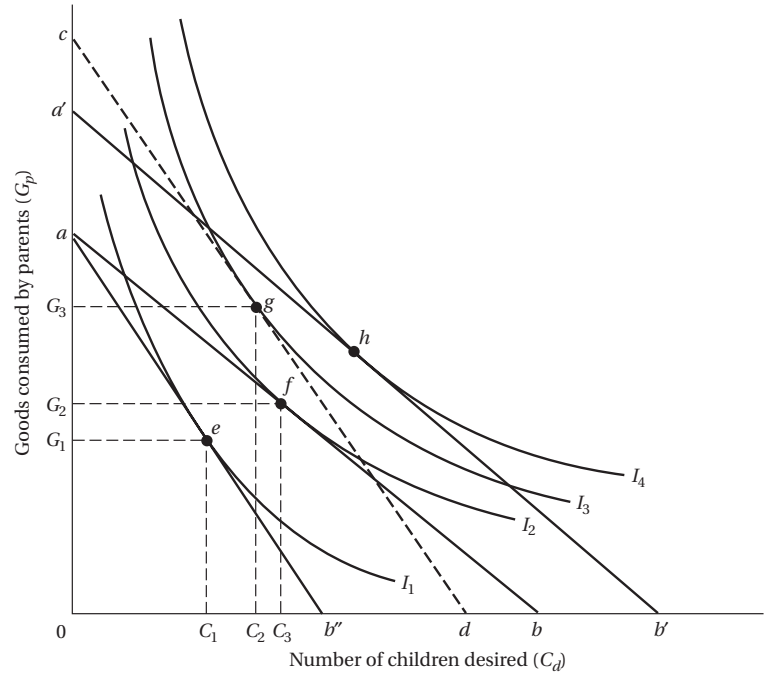
where C_d, the demand for surviving children (an important consideration in low-income societies where infant mortality rates are high), is a function of the given level of household income (Y), the "net" price of children (the difference between anticipated costs, mostly the opportunity cost of a mother's time, and benefits, potential child income and old-age support, P_c), the prices of all other goods (P_x), and the tastes for goods relative to children (t_x). Under standard neoclassical conditions, we would expect the following (expressed both mathematically and in words):

$\partial C_d/\partial Y > 0$	The higher the household income, the greater the demand for children.
$\partial C_d/\partial P_c < 0$	The higher the net price of children, the lower the quantity demanded.
$\partial C_d/\partial P_x > 0$	The higher the prices of all other goods relative to children, the greater the quantity of children demanded.
$\partial C_d/\partial t_x < 0$	The greater the strength of tastes for goods relative to children, the fewer children demanded.

Microeconomic theory of fertility The theory that family formation has costs and benefits that determine the size of families formed.

Figure 6.9 provides a simplified diagrammatic presentation of the **microeconomic theory of fertility**. The number of desired (surviving) children, C_d, is

FIGURE 6.9 Microeconomic Theory of Fertility: An Illustration



measured along the horizontal axis, and the total quantity of goods consumed by the parents, G_p, is measured on the vertical axis.

Household desires for children are expressed in terms of an indifference map representing the subjective degree of satisfaction derived by the parents for all possible combinations of commodities and children. Each individual indifference curve portrays a locus of commodity-child combinations that yield the same amount of satisfaction. Any point (or combination of goods and children) on a "higher" indifference curve—that is, on a curve farther out from the origin—represents a higher level of satisfaction than any point on a lower indifference curve. But each indifference curve is a "constant satisfaction" locus.

In Figure 6.9, only four indifference curves, I_1 to I_4, are shown; in theory, there is an infinite set of such curves, filling the whole quadrant and covering all possible commodity-child combinations. The household's ability to "purchase" alternative combinations of goods and children is shown by the budget constraint line, *ab*. Thus, all combinations on or below line *ab* (within the triangular area 0*ab*) are financially attainable by the household on the basis of its perceived income prospects and the relative prices of children and goods, as represented by the slope of the *ab* budget constraint. The steeper the slope of the budget line, the higher the price of children relative to goods.

According to the demand-based theory of fertility, the household chooses from among all attainable combinations the one combination of goods and children that maximizes family satisfaction on the basis of its subjectively determined preferences. Diagrammatically, this optimal combination is represented by point *f*, the tangency point between the budget constraint, *ab*, and indifference curve, I_2. Therefore, C_3 children and G_2 goods will be demanded.

A rise in family income, represented in Figure 6.9 by the parallel outward shift of the budget line from *ab* to *a′b′*, enables the household to attain a higher level of satisfaction (point *h* on curve I_4) by consuming more of *both* commodities and children—that is, if children, like most commodities, are assumed to be normal goods (demand for them rises with income), an important if in low-income countries where children are often in demand primarily as a source of future financial security. Note that as income rises, parents may spend more on each child, preferring a smaller number of children, each of higher "quality," for example, healthier and better educated.

Similarly, an increase in the price (opportunity cost) of children relative to other goods will cause households to substitute commodities for children. Other factors (namely, income and tastes) being constant, a rise in the relative price of children causes the household utility-maximizing consumption combination to occur on a lower indifference curve, as shown by the movement of the equilibrium point from *f* to *e* when the budget line rotates around point *a* to *ab″*.

Note, finally, that if there is a simultaneous increase in household income and net child price as a result of, say, expanding female employment opportunities and a rise in wages, coupled with a tax on children beyond a certain number per family, there will be *both* an outward shift and downward rotation of the budget constraint line of Figure 6.9 to, say, dashed line *cd*. The result is a new utility-maximizing combination that includes fewer children per family (point *g* compared with point *f*). In other words, higher levels of living for low-income families in combination with a relative increase in the price of children (whether brought about directly by fiscal measures or indirectly by expanded female employment opportunities) will motivate households to have fewer children while still improving their welfare. This is just one example of how the economic theory of fertility can shed light on the relationship between economic development and population growth as well as suggest possible lines of policy.

The Demand for Children in Developing Countries

The economic theory of fertility assumes that the household demand for children is determined by family preferences for a certain number of surviving (usually male) children (i.e., in regions of high mortality, parents may produce more children than they actually desire in the expectation that some will not survive), by the price or "opportunity cost" of rearing these children, and by levels of family income. Children in poor societies are seen partly as economic investment goods in that there is an expected return in the form of both child labor and the provision of financial support for parents in old age.[12] However, in many developing countries, there is a strong intrinsic psychological and cultural determinant of family size, so the first two or three children should be viewed as "consumer" goods for which demand may not be very responsive to relative price changes.

The choice mechanism in the economic theory of fertility as applied to developing countries is assumed, therefore, to exist primarily with regard to the additional ("marginal") children who are considered as investments. In deciding whether or not to have *additional* children, parents are assumed to weigh private economic benefits against private costs, where the principal benefits are the expected income from child labor, usually on the farm, and eventual financial support for elderly parents. Balanced against these benefits are the two principal elements of cost: the opportunity cost of the mother's

time (the income she could earn if she were not at home caring for her children) and the cost of educating children—the financial trade-off between having fewer "high-quality," high-cost, educated children with high-income-earning potential versus more "low-quality," low-cost, uneducated children with much lower earning prospects.

Using the same thought processes as in the traditional theory of consumer behavior, the theory of family fertility concludes that when the price or cost of children rises as a result of, say, increased educational and employment opportunities for women or a rise in school fees or the establishment of minimum-age child labor laws or the provision of publicly financed old-age social security schemes, parents will demand fewer additional children, substituting, perhaps, quality for quantity or a mother's employment income for her child-rearing activities. It follows that one way to induce families to desire fewer children is to raise the price of child rearing by, say, providing greater educational opportunities and a wider range of higher-paying jobs for young women.

Recent research on household behavior has led to a major improvement of this theory. Households in developing countries generally do not act in a "unitary" manner, depicted with this traditional model. Instead, men and women have different objective functions; for example, husbands may prefer to have more children than wives. Household behavior is then explained as a result of *bargaining* between husbands and wives. Although the broad impacts we have just described continue to hold, the process includes increased bargaining power of women. Nonunitary, bargaining-based models of household behavior also improve our understanding of otherwise puzzlingly inefficient household behaviors, such as higher investment in husbands' farm plots than wives' farm plots even when a more even investment could lead to higher family incomes.[13]

Some Empirical Evidence Statistical studies in a broad spectrum of developing countries have provided support for the economic theory of fertility.[14] For example, it has been found that high female employment opportunities outside the home and greater female school attendance, especially at the primary and secondary levels, are associated with significantly lower levels of fertility. As women become better educated, they tend to earn a larger share of household income and to produce fewer children. Moreover, these studies have confirmed the strong association between declines in child mortality and the subsequent decline in fertility. Assuming that households desire a target number of surviving children, increased female education and higher levels of income can decrease child mortality and therefore increase the chances that the firstborn will survive. As a result, fewer births may be necessary to attain the same number of surviving children. This fact alone underlines the importance of educating women and improving public health and child nutrition programs in reducing fertility levels.

Implications for Development and Fertility

All of the foregoing can be summarized by saying that the effect of social and economic progress in lowering fertility in developing countries will be

the greatest when the majority of the population and especially the very poor share in its benefits. Specifically, birth rates among the very poor are likely to fall where the following socioeconomic changes come to pass:

1. An increase in the education of women and a consequent improvement in their role and status
2. An increase in female nonagricultural wage employment opportunities, which raises the price or cost of their traditional child-rearing activities
3. A rise in family income levels through the increased direct employment and earnings of a husband and wife or through the redistribution of income and assets from rich to poor
4. A reduction in infant mortality through expanded public health programs and better nutritional status for both mother and child, and better medical care
5. The development of old-age and other social security systems outside the extended family network to lessen the economic dependence of parents, especially women, on their offspring
6. Expanded schooling opportunities so that parents can better substitute child "quality" for large numbers of children

In short, expanded efforts to make jobs, education, and health more broadly available to poverty groups in general and women in particular will not only contribute to their economic and psychic well-being (i.e., to their development) but also contribute substantially to their motivation for smaller families (i.e., their freedom to choose), which is vital to reducing population growth rates. Where such motivation exists, well-executed **family-planning programs** can then be an effective tool.[15] But before discussing policy issues and what government might or might not do, we should point out that while there seems to be considerable agreement regarding the determinants or causes of population growth, substantial disagreement and controversy remain regarding its consequences.

Family-planning programs Public programs designed to help parents plan and regulate their family size.

6.5 The Consequences of High Fertility: Some Conflicting Perspectives

For many years, development economists and other social scientists have debated the seriousness of the consequences of rapid population growth.[16] On the one hand, we must recognize that population growth is not the only, or even the primary, source of low levels of living, eroding self-esteem, and limited freedom in developing nations. On the other hand, it would be equally naive to think that rapid population growth in many countries and regions is not a serious intensifier and multiplier of those integral components of underdevelopment, especially the first and third. The following discussion summarizes some of the main arguments for and against the idea that the consequences of rapid population growth lead to serious development problems. It then

considers whether some consensus can be reached so that specific policy goals and objectives can be postulated.[17]

It's Not a Real Problem

We can identify three general lines of argument on the part of people who assert that population growth is not a cause for concern:

- The problem is not population growth but other issues.
- Population growth is a false issue deliberately created by dominant rich-country agencies and institutions to keep developing countries in their dependent condition.
- For many developing countries and regions, population growth is in fact desirable.

Other Issues Many observers from both rich and poor nations argue that the real problem is not population growth per se but one or all of the following four issues.

1. ***Underdevelopment.*** If correct strategies are pursued and lead to higher levels of living, greater self-esteem, and expanded freedom, population will take care of itself. Eventually, it will disappear as a problem, as it has in all of the present economically advanced nations. According to this argument, underdevelopment is the real problem, and development should be the only goal. With it will come economic progress and social mechanisms that will more or less automatically regulate population growth and distribution. As long as people in developing countries remain impoverished, uneducated, and unhealthy and the social safety net remains weak, the large family will constitute the only real source of social security (i.e., parents will continue to be denied the freedom to choose a small family if they so desire). Some proponents of the underdevelopment argument then conclude that birth control programs will surely fail, as they have in the past, when there is no motivation on the part of poor families to limit their size.
2. ***World Resource Depletion and Environmental Destruction.*** Population can only be an economic problem in relation to the availability and utilization of scarce natural and material resources. The fact is that developed countries, with less than one-quarter of the world's population, consume almost 80% of the world's resources. In terms of the depletion of the world's limited resources, therefore, the addition of another child in the developed countries is as significant as the birth of many times as many additional children in the underdeveloped countries. According to this argument, developed nations should curtail their excessively high consumption standards instead of asking less developed nations to restrict their population growth. The latter's high fertility is really due to their low levels of living, which are in turn largely the result of the overconsumption of the world's scarce resources by rich nations. This combination of rising affluence and extravagant consumption habits in rich

countries and among rich people in poor countries, and not population growth, should be the major world concern. We will analyze issues of the environment and development in Chapter 10.

3. ***Population Distribution.*** According to this third argument, it is not the number of people per se that is causing population problems but their distribution in space. Many regions of the world (e.g., parts of sub-Saharan Africa) and many regions within countries (e.g., the northeastern and Amazon regions of Brazil) are viewed as underpopulated in terms of available or potential resources. Others simply have too many people concentrated in too small an area (e.g., central Java or most urban concentrations). Governments should therefore strive not to moderate the rate of population growth but rather to bring about a more natural spatial distribution of the population in terms of available land and other productive resources.
4. ***Subordination of Women.*** Perhaps most important, as noted previously, women often bear the disproportionate burdens of poverty, poor education, and limited social mobility. In many cases, their inferior roles, low status, and restricted access to birth control are manifested in their high fertility. According to this argument, population growth is a natural outcome of women's lack of economic opportunity. If women's health, education, and economic well-being are improved along with their role and status in both the family and the community, this empowerment of women will inevitably lead to smaller families and lower population growth.

It's a Deliberately Contrived False Issue

The second main line of argument denying the significance of population growth as a major development problem is closely allied to the neocolonial dependence theory of underdevelopment discussed in Chapter 3. Basically, it is argued that the overconcern in the rich nations with the population growth of poor nations is really an attempt by the former to hold down the development of the latter in order to maintain an international status quo that is favorable to the rich nations' self-interests. Rich nations are pressuring poor nations to adopt aggressive population control programs, even though they themselves went through a period of sizable population increase that accelerated their own development processes.

A radical neo-Marxist version of this argument views population control efforts by rich countries and their allied international agencies as racist or genocidal attempts to reduce the relative or absolute size of the poor, largely nonwhite populations of the world who may someday pose a serious threat to the welfare of the rich, predominantly white societies. Worldwide birth control campaigns are seen as manifestations of the fears of the developed world in the face of a possible radical challenge to the international order by the people who are its first victims.

It's a Desirable Phenomenon

A more conventional economic argument is that of population growth as an essential ingredient to stimulate economic development. Larger populations

provide the needed consumer demand to generate favorable economies of scale in production, to lower production costs, and to provide a sufficient and low-cost labor supply to achieve higher output levels. Population "revisionist" economists of the neoclassical counterrevolution school argue, for example, that free markets will always adjust to any scarcities created by population pressures.[18] Such scarcities will drive up prices and signal the need for new cost-saving production technologies. In the end, free markets and human ingenuity (Julian Simon's "genius" as the "ultimate resource") will solve any and all problems arising from population growth. This revisionist viewpoint was clearly in contrast with the traditional "orthodox" argument that rapid population growth had serious economic consequences that, if left uncorrected, would slow economic development.

At the other end of the political spectrum, it has been argued by some developing-world neo-Marxist pronatalists that many rural regions in developing countries are in reality underpopulated in the sense that much unused but arable land could yield large increases in agricultural output if only more people were available to cultivate it. Many regions of tropical Africa and Latin America and even parts of Asia are said to be in this situation. With respect to Africa, for example, some observers have noted that many regions had larger populations in the remote past than after independence.[19] Their rural depopulation resulted not only from the slave trade but also from compulsory military service, confinement to reservations, and the forced-labor policies of former colonial governments. For example, the sixteenth-century Kongo kingdom is said to have had a population of approximately 2 million. But by the time of the colonial conquest, which followed 300 years of slave trade, the population of the region had fallen to less than one-third of that figure. After independence, parts of the Democratic Republic of Congo (formerly known as the Belgian Congo and later as Zaire) had barely caught up to the sixteenth-century numbers.[20] Other regions of western and eastern Africa provide similar examples—at least in the eyes of advocates of rapid population growth in Africa.

In terms of ratios of population to arable land (land under cultivation, fallow land, pastures, and forests), Africa south of the Sahara is said by these supporters of population expansion to have a total of 1.4 billion arable hectares. Land actually being cultivated amounts to only a fraction of this potential. Thus, only 12% of all potential arable land is under cultivation, and this low rural population density is viewed as a serious drawback to raising agricultural output.[21] Similar arguments have been expounded with regard to such Latin American countries as Brazil and Argentina.

Three other noneconomic arguments, each found to some degree in a wide range of developing countries, complete the "population growth is desirable" viewpoint. First, many countries claim a need for population growth to protect currently underpopulated border regions against the expansionist intentions of neighboring nations. Second, there are many ethnic, racial, and religious groups in less developed countries whose attitudes favoring large family size have to be protected for both moral and political reasons. Finally, military and political power are often seen as dependent on a large and youthful population.

Many of these arguments have a certain realism about them—if not in fact, then at least in the perceptions of vocal and influential individuals in both the developed and developing worlds. The important point is that they represent

a considerable range of opinions and viewpoints and therefore need to be seriously weighed against the counterarguments of theorists who believe that rapid population growth is indeed a real and important problem for underdeveloped countries. Let us now look at some of these counterarguments.

It *Is* a Real Problem

Positions supporting the need to curtail population growth because of the negative economic, social, and environmental consequences are typically based on one of the following three arguments.

The Extremist Argument: Population and Global Crisis The extreme version of the population-as-problem position attempts to attribute almost all of the world's economic and social evils to excessive population growth. Unrestrained population increase is seen as the major crisis facing humankind today. It is regarded as the principal cause of poverty, low levels of living, malnutrition, ill health, environmental degradation, and a wide array of other social problems. Value-laden and incendiary terms such as *population bomb* and *population explosion* are tossed around. Indeed, dire predictions of world food catastrophes and ecological disaster are often attributed almost entirely to the growth in population numbers.[22] Such an extreme position leads some of its advocates to assert that "world" (i.e., developing country) population stabilization or even decline is the most urgent contemporary task, even if it requires severe and coercive measures such as compulsory sterilization to control family size in some of the most densely populated developing countries, such as India and Bangladesh.

The Theoretical Argument: Population-Poverty Cycles and the Need for Family-Planning Programs The **population-poverty cycle** theory is the main argument advanced by economists who hold that too rapid population growth yields negative economic consequences and thus should be a real concern for developing countries. Advocates start from the basic proposition that population growth intensifies and exacerbates the economic, social, and psychological problems associated with the condition of underdevelopment. Population growth is believed to retard the prospects for a better life for the already born by reducing savings rates at the household and national levels. It also severely draws down limited government revenues simply to provide the most rudimentary economic, health, and social services to the additional people. This, in turn, further reduces the prospects for any improvement in the levels of living of the existing generation and helps transmit poverty to future generations of low-income families.

Population-poverty cycle A theory to explain how poverty and high population growth become reinforcing.

Because widespread absolute poverty and low levels of living are thus seen as a major cause of large family size, and large families retard economic growth, it follows that economic and social development is a necessary condition for bringing about an eventual slowing or cessation of population growth at low levels of fertility and mortality. But according to this argument, it is not a sufficient condition—that is, development provides people with the incentives and motivations to limit their family size, but family-planning programs

are needed to provide them with the technological means to avoid unwanted pregnancies. Even though countries such as France, Japan, the United States, Great Britain, and, more recently, Taiwan and South Korea were able to reduce their population growth rates without widespread family-planning clinics, it is argued that the provision of these services will enable other countries desiring to control excessive population growth to do so more rapidly than if these family-planning services were not available.

A Simple Model A basic model that economists use to demonstrate these adverse consequences of rapid population growth is a simplification of the standard Solow-type neoclassical growth equation.[23] Using the standard production function, $Y = f(K,L,R,T)$—that is, output is a function of capital, labor, resources, and technology—and holding the resource base fixed, we can derive the result that

$$y - l = \alpha(k - l) + t \tag{6.2}$$

where y = rate of GNI growth $\Delta Y/Y$, l = rate of labor force (population) growth $\Delta L/L$, k = rate of growth of the capital stock $\Delta K/K$, α = capital elasticity of output (usually found to be constant), and t = the effect of technological change (the Solow residual in empirical studies of sources of economic growth).

Assuming constant returns to scale, Equation 6.2 simply states that the rate of per capita income growth $(y - l)$ is directly proportional to the rate of growth of the capital-labor ratio $(k - l)$ plus the residual effects of technological progress (including improved human and physical capital). Therefore, in the absence of technological change, the higher the rate of population growth (l), the more rapid the rate of capital stock growth (k) must be and thus the greater the concomitant savings and investment rate just to maintain constant levels of per capita income. Moreover, because k may not be independent of l, as is traditionally assumed in neoclassical growth models, but may in fact be inversely related due to the reduced savings impact implied by the higher dependency burden effects of rapid population growth, it follows that the negative economic impact of population growth may even be greater than these models imply. Finally, if low incomes induce poor families to have more children as a source of cheap labor and old-age security, then we have another vicious circle in progress—poor people have large families partly to compensate for their poverty, but large families mean greater population growth, higher dependency burdens, lower savings, less investment, slower economic growth, and ultimately greater poverty. In an extreme case, a neo-Malthusian population trap can emerge. Population growth is thus seen as both a cause and a consequence of underdevelopment!

However, keep in mind that, as you saw in Chapters 3 and 4, population growth can tell only part of the story of economic growth. In this regard, William Easterly argued that "even if population growth lowered per capita growth one for one (the general view of the population alarmists), this would explain only about one-third of the variation in per capita growth."[24] Growth in productivity, especially as spurred by structural transformation of the economy (Chapter 3), is usually more important in economic development outcomes.

Other Empirical Arguments: Seven Negative Consequences of Population Growth According to the latest empirical research, the potential negative consequences of population growth for economic development can be divided into seven categories: its impact on economic growth, poverty and inequality, education, health, food, the environment, and international migration.[25]

1. ***Economic Growth.*** Evidence shows that although it is not the culprit behind economic stagnation, rapid population growth lowers per capita income growth in most developing countries, especially those that are already poor, dependent on agriculture, and experiencing pressures on land and natural resources.

2. ***Poverty and Inequality.*** Even though aggregate statistical correlations between measures of poverty and population growth at the national level are often inconclusive, at the household level the evidence is strong and compelling. The negative consequences of rapid population growth fall most heavily on the poor because they are the ones who are made landless, suffer first from cuts in government health and education programs, and bear the brunt of environmental damage. Poor women once again bear the greatest burden of government austerity programs, and another vicious circle ensues. To the extent that large families perpetuate poverty, they also exacerbate inequality.

3. ***Education.*** Although the data are sometimes ambiguous on this point, it is generally agreed that large family size and low incomes restrict the opportunities of parents to educate all their children. At the national level, rapid population growth causes educational expenditures to be spread more thinly, lowering quality for the sake of quantity. This in turn feeds back on economic growth because the stock of human capital is reduced by rapid population growth.

4. ***Health.*** High fertility harms the health of mothers and children. It increases the health risks of pregnancy, and closely spaced births have been shown to reduce birth weight and increase child mortality rates.

5. ***Food.*** Feeding the world's population is made more difficult by rapid population growth—a large fraction of developing country food requirements are the result of population increases. New technologies of production must be introduced more rapidly, as the best lands have already been cultivated. International food relief programs become more widespread.

6. ***Environment.*** Rapid population growth contributes to environmental degradation in the form of forest encroachment, deforestation, fuelwood depletion, soil erosion, declining fish and animal stocks, inadequate and unsafe water, air pollution, and urban congestion (see Chapter 10).

7. ***International Migration.*** Many observers consider the increase in international migration, both legal and illegal, to be one of the major consequences of developing countries' population growth. Though many factors spur migration (see Chapter 7), an excess of job seekers (caused by rapid

population growth) over job opportunities is surely one of them. However, unlike the first six consequences listed here, some of the economic and social costs of international migration fall on recipient countries, increasingly in the developed world. It is not surprising, therefore, that this issue has recently taken on political importance in North America and Europe (see Chapter 2).

Goals and Objectives: Toward a Consensus

In spite of what may appear to be seriously conflicting arguments about the positive and negative consequences of population growth, a common ground has emerged on which many people on both sides of the debate can agree. This position is characterized succinctly by Robert Cassen:

> After decades of controversy over the issue of population policy, there is a new international consensus among and between industrial and developing countries that individuals, countries, and the world at large would be better off if population were to grow more slowly. The consequences of rapid population growth should be neither exaggerated nor minimized. Some past expressions of alarm have been counterproductive, alienating the very audiences they were intended to persuade; at the same time, claims that population growth was not all that important have had the effect of diminishing a proper concern for the subject.[26]

The following three propositions constitute the essential components of this intermediate or consensus opinion.

1. Population growth is not the primary cause of low levels of living, extreme inequalities, or the limited freedom of choice that characterize much of the developing world. The fundamental causes of these problems must be sought, rather, in the plight of poor families, especially women, and the failure of other aspects of domestic and international development policy.
2. The problem of population is not simply one of numbers but involves the quality of life and material well-being. Thus, developing country population size must be viewed in conjunction with developed-country affluence in relation to the quantity, distribution, and utilization of world resources, not just in relation to developing countries' indigenous resources.
3. Rapid population growth does serve to intensify problems of underdevelopment and to make prospects for development that much more remote. As noted, the momentum of growth means that, barring catastrophe, the population of developing countries will increase dramatically over the coming decades, no matter what fertility control measures are adopted now. It follows that high population growth rates, though not the principal cause of underdevelopment, are nevertheless important contributing factors in specific countries and regions of the world.

In view of these three propositions, we may conclude that the following three policy goals and objectives might be included in any realistic approach to the issue of population growth in developing countries.

1. In countries or regions where population size, distribution, and growth are viewed as an existing or potential problem, the primary objective of any strategy to limit further growth must deal not only with the population variable per se but also with the underlying social and economic conditions of underdevelopment. Problems such as absolute poverty, gross inequality, widespread unemployment (especially among women), limited female access to education, malnutrition, and poor health facilities must be given high priority. Their amelioration is both a necessary concomitant of development and a fundamental motivational basis for the expanded freedom of the individual to choose an optimal—and in many cases, smaller—family size.
2. To bring about smaller families through development-induced motivations, family-planning programs providing both the education and the technological means to regulate fertility for people who wish to regulate it should be established.
3. Developed countries should help developing countries achieve their lowered fertility and mortality objectives, not only by providing contraceptives and funding family-planning clinics, but also, even more important, by curtailing their own excessive depletion of nonrenewable world resources through programs designed to cut back on the unnecessary consumption of products that intensively use such resources; by making genuine commitments to eradicating poverty, illiteracy, disease, and malnutrition in developing countries as well as their own; and by recognizing in both their rhetoric and their international economic and social dealings that development is the real issue, not simply population control.

6.6 Some Policy Approaches

In view of these broad goals and objectives, what kinds of economic and social policies might developing and developed-country governments and international assistance agencies consider to bring about long-term reductions in the overall rate of world population growth? Three areas of policy can have important direct and indirect influences on the well-being of present and future world populations:

1. General and specific policies that developing country governments can initiate to influence and perhaps even control their population growth and distribution
2. General and specific policies that developed-country governments can initiate in their own countries to lessen their disproportionate consumption of limited world resources and promote a more equitable distribution of the benefits of global economic progress
3. General and specific policies that developed-country governments and international assistance agencies can initiate to help developing countries achieve their population objectives

Let us deal with each of these areas in turn.

What Developing Countries Can Do

Earlier discussions have led to the conclusion that the principal variables influencing the demand for children at the family level are the ones most closely associated with the concept of development as we have defined it in Chapter 1. Thus, certain development policies are particularly crucial in the transition from a high-growth to a low-growth population. These policies aim at eliminating absolute poverty; lessening income inequalities; expanding educational opportunities, especially for women; providing increased job opportunities for both men and women; bringing the benefits of modern preventive medicine and public health programs, especially the provision of clean water and sanitation, to the rural and urban poor; improving maternal and child health through more food, better diets, and improved nutrition so as to lower infant mortality; and creating a more equitable provision of other social services to wide segments of the population. Again, it is not numbers per se or parental irrationality that is at the root of the "population problem." Rather, it is the pervasiveness of absolute poverty and low levels of living that provide the economic rationale for large families and burgeoning populations. And it is the spillover effects or negative social externalities of these private parental decisions (e.g., for education, health care, food supplies, environment and resource degradation, job creation, overall growth, and income distribution) that provide the strictly economic efficiency justification (in terms of "market failure" arguments) for government intervention in population matters. Clearly, there are noneconomic justifications as well.

Although long-run development policies of the kind just outlined are essential to ultimate population stabilization, there are five more specific policies that developing country governments might try to adopt to lower birth rates in the short run.[27]

First, they can try to *persuade people* to have smaller families through the media and the educational process, both formal (school system) and informal (adult education).

Second, they can *enhance family-planning programs* to provide health and contraceptive services to encourage the desired behavior. Such publicly sponsored or officially supported programs now exist in most developing countries. Today only a few countries do not have such publicly sponsored or officially endorsed family-planning programs. However, there remains substantial unmet demand for contraceptives, as seen in Box 6.3.

Third, they can deliberately *manipulate economic incentives and disincentives* for having children—for example, through the elimination or reduction of maternity leaves and benefits, the reduction or elimination of financial incentives, or the imposition of financial penalties for having children beyond a certain number; the establishment of old-age social security provisions and minimum-age child labor laws; the raising of fees and elimination of heavy public subsidies for higher education; and the subsidization of smaller families through direct money payments. Although some form of population-related *incentive or disincentive schemes* now exist in over 30 developing countries, Singapore, India, Bangladesh, South Korea, and China have been especially prominent in experimenting with policies to reduce family size. For example, Singapore allocated scarce public housing without giving consideration to

BOX 6.3 FINDINGS Contraceptives Need and Use in Developing Countries, 2003 to 2012

Jacqueline Darroch and Susheela Singh analyzed the use and need for contraceptives in developing countries, using data from comparable national surveys for married and unmarried women ages 15 to 49 in 2003, 2008, and 2012. Darroch and Singh estimated numbers and percentages of women wanting to avoid pregnancy, according to whether they were using modern contraceptives, or using either no method or only a traditional method. They found that "the number of women wanting to avoid pregnancy and therefore needing effective contraception increased substantially," from 716 million in 2003 to 867 million in 2012. Most of the increase corresponded to population growth. The percentage of women wishing to avoid pregnancy also rose, from 54% in 2003 to 57% in 2012. At the same time, the "use of modern contraceptive methods also increased, and the overall proportion" of all women ages 15-49 "with "unmet need for modern methods among those wanting to avoid pregnancy decreased," from 29% in 2003, to 26% in 2012 (although the number rose from 210 million to 222 million). The unmet need for modern contraceptives among those wanting to avoid pregnancy remained very high, "especially in sub-Saharan Africa (53 million [60%] of 89 million), south Asia (83 million [34%] of 246 million), and western Asia (14 million [50%] of 27 million)." The authors maintained that, "to meet the unmet need for modern contraception, countries need to increase resources, improve access to contraceptive services and supplies, and provide high-quality services and large-scale public education interventions to reduce social barriers."

Source: Jacqueline Darroch and Susheela Singh. "Trends in contraceptive need and use in developing countries in 2003, 2008, and 2012: An analysis of national surveys." *The Lancet* 381 (May 18, 2013): 1756–1762.

family size. It also limited paid maternity leave to a maximum of two children, scaling the delivery fee according to number of children and reducing income tax relief from five to three children. In 1984, it even went so far as to give special priority in school admission to all children born to women with university degrees while penalizing non-degree-holding women with more than two children. The presumed but dubious rationale was that educated women have brighter children whose births should be encouraged while discouraging the less educated (and presumably less intelligent) women from bearing more children. But fertility fell so dramatically that by 2004, the city-state had introduced incentives to *increase* fertility (as with Japan and Europe, relaxed controls on immigration would be more cost-effective). China has by far the most comprehensive set of state-enforced incentives and disincentives; they are described in the case study at the end of this chapter.

Fourth, governments can attempt to *coerce people* into having smaller families through the power of state legislation and penalties. For obvious reasons, few governments would attempt to engage in such coercion; not only is it often morally repugnant and politically unacceptable, but it is also almost always extremely difficult to administer. The defeat of Indian Prime Minister Indira Gandhi's government in 1977 was largely due to popular resentment of the government's forced-sterilization program.

Finally, no policy measures will be successful in controlling fertility unless efforts are made to *raise the social and economic status of women* and hence create

conditions favorable to delayed marriage and lower marital fertility.[28] A crucial ingredient in any program designed to lower fertility rates is the increased education of women, followed by the creation of jobs for them outside the home. The availability of income-earning opportunities can lead young women to delay marriage by enabling them to become economically self-sufficient and therefore in a better position to exercise control over their choice of partner and the timing of marriage. It can also reduce family pressures for early marriage by allowing women to make a contribution to parental household income. An independent source of income also secures a stronger position for married women in the household, reducing their dependence on other family members, particularly male offspring, for economic security. Furthermore, it enables women to consider the opportunity costs of additional children when childbearing competes with income-generating activities. In general, the availability of outside sources of income offers women genuine alternatives to early marriage and frequent childbearing, which are often motivated by their lack of resources. An additional benefit of employment outside the home is that it reduces women's isolation, which is often an impediment to the provision of family-planning services, and can increase their household bargaining power.[29]

The importance of these policies to improve the role and status of women was underlined at the 1994 Cairo International Conference on Population and Development, where emphasis was placed on the general empowerment of women, especially in the area of **reproductive choice**. The Cairo Program of Action summarized this position in the following manner:

Reproductive choice The concept that women should be able to determine on an equal status with their husbands and for themselves how many children they want and what methods to use to achieve their desired family size.

> The empowerment and autonomy of women and the improvement of their political, social, economic and health status . . . [are] essential for the achievement of sustainable development and . . . for the long-term success of population programs. Experience shows that population and development programs are most effective when steps have simultaneously been taken to improve the status of women.[30]

What the Developed Countries Can Do

When we view the problems of population from the perspective of global resources and the environment, as we should, the question of the relationship between population size and distribution and the depletion of many nonrenewable resources in developed and underdeveloped countries assumes major importance. In a world where 4.5% of the population, located in one country, the United States, accounts for nearly one-fifth of the annual world total energy use, we are clearly not dealing only or even primarily with a problem of population numbers when it comes to environment and resources. We must also be concerned with the impact of rising affluence and the very unequal worldwide distribution of incomes on the depletion of many nonrenewable resources such as petroleum, certain basic metals, and other raw materials essential for economic growth. The use of fossil fuel energy to power private automobiles, operate home and office air conditioners, and so on in the developed nations remains the major contributor of carbon dioxide (CO_2) gases into the atmosphere and to the phenomenon of greenhouse global warming (see Chapter 10).[31] It also means that there is potentially that much less to fertilize

small family farms in the less developed nations. Alternatively, it means that poor families will have to pay more to obtain these valuable resource inputs.

Many similar examples could be given of the gross inequalities in global resource use. Perhaps more important, one could cite innumerable instances of the unnecessary and costly waste of many scarce and nonrenewable resources by the affluent developed nations. The point, therefore, is that any worldwide program designed to engender a better balance between resources and people by limiting developing-country population growth through social intervention and family planning must also include the responsibility of rich nations to simplify their own consumption demands and lifestyles. Such changes would free resources that could then be used by poor nations to generate the social and economic development essential to slowing population growth.

In addition to simplifying lifestyles and consumption habits, one other positive (if unlikely) internal policy that rich nations could adopt to mitigate current world population problems would be to liberalize the legal conditions for the international immigration of poor, unskilled workers and their families from Africa, Asia, and Latin America to North America, Europe, Japan, and Australia. The international migration of peasants from Europe to North America, Australia, and New Zealand in the nineteenth and early twentieth centuries was a major factor in moderating the problems of underdevelopment and population pressure in European countries. No such safety valve or outlet exists today for developing countries. In fact, what few outlets existed have over the past two decades been progressively closed. Yet clearly, many labor-scarce societies could benefit economically from international migration, and the benefits to developing countries would be enormous. For example, the United Nations has estimated that legal barriers to international migration from the developing to the developed world cost developing nations at least $250 billion a year.[32]

How Developed Countries Can Help Developing Countries with Their Population Programs

There are a number of ways in which the governments of rich countries and multilateral donor agencies can help the governments of developing countries achieve their population policy objectives sooner. The most important of these concerns the willingness of rich countries to be of genuine assistance to poor countries in their development efforts, particularly in sub-Saharan Africa. Such genuine support would consist not only of expanded public and private financial assistance but also of improved trade relations, such as tariff- and quota-free access to developed-country markets, more appropriate technology transfers, assistance in developing indigenous scientific research capacities, better international commodity-pricing policies, and a more equitable sharing of the world's scarce natural resources. (These and other areas of international economic relations between rich and poor countries will be examined in Part Three.)

There are two other activities more directly related to fertility moderation in which rich-country governments, international donor agencies, and private nongovernmental organizations (NGOs) can play an important assisting role. The first is the area of research into the technology of fertility control, the

contraceptive pill, modern intrauterine devices (IUDs), voluntary sterilization procedures, and, particularly in the age of AIDS, effective barrier contraception. Research has been going on in this area for a number of years, almost all of it financed by international donor organizations, private foundations, and aid agencies of developed countries. Further efforts to improve the effectiveness of this low-cost contraceptive technology while minimizing the health risks should be encouraged.

The second area includes financial assistance from developed countries for family-planning programs, public education, and national population policy research activities in the developing countries. This has traditionally been the primary area of developed-country assistance in the field of population. Total resources devoted to these activities have risen dramatically. It remains an open question, however, whether such resources (especially those allocated to premature family-planning programs) might not have been more effectively used to achieve their fertility goals had they instead been devoted directly to helping low-income countries to raise the levels of living of their poorest people. As pointed out earlier, it is of little value to have sophisticated family-planning programs when people are not motivated to reduce family size.

We conclude with a note of optimism. Fertility rates in many of the poorest countries, such as Bangladesh and most of the countries in sub-Saharan Africa, have experienced an impressive decline. Population experts have lowered their estimates of world population growth for coming decades. In no small part, this decline is the result of more widespread availability of family planning. This change helps set the stage for an opportunity for successful development efforts in the coming years, but developed countries need to do their part in providing expanded development assistance, especially efforts focused on the need and opportunity to greatly reduce the incidence of poverty, which remains the biggest cause of high rates of fertility.