

# Booms, Busts, and Echoes

**How the biggest demographic upheaval in history is affecting global development**

*David E. Bloom and David Canning*

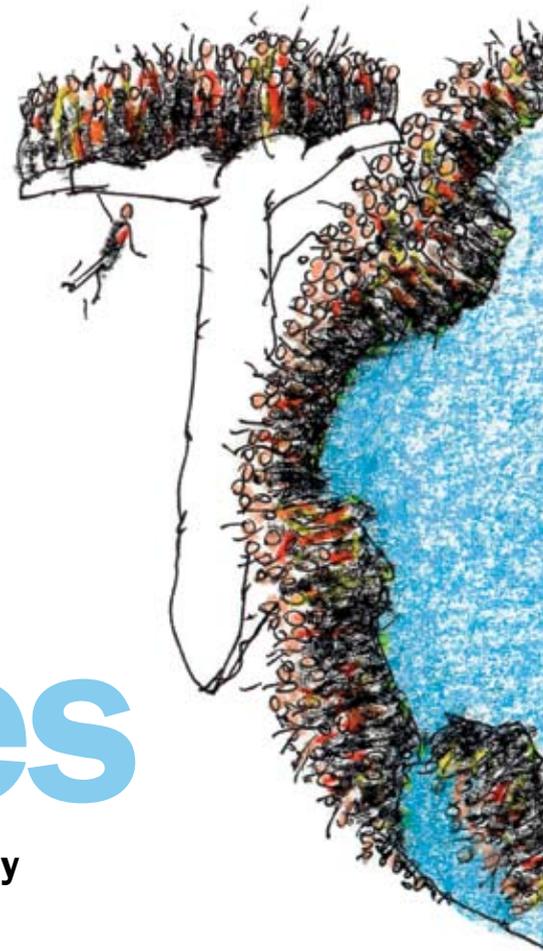
**F**OR MUCH (and perhaps most) of human history, demographic patterns were fairly stable: the human population grew slowly, and age structures, birth rates, and death rates changed very little. The slow long-run growth in population was interrupted periodically by epidemics and pandemics that could sharply reduce population numbers, but these events had little bearing on long-term trends.

Over the past 140 years, however, this picture has given way to the biggest demographic upheaval in history, an upheaval that is still running its course. Since 1870 death rates and birth rates have been declining in developed countries. This long-term trend toward lower fertility was interrupted by a sharp, post-World War II rise in fertility, which was followed by an equally sharp fall (a “bust”), defining the “baby boom.” The aging of this generation and continued declines in fertility are shifting the population balance in developed countries from young to old. In the developing world, reductions in mortality resulting from improved nutrition, public health infrastructure, and medical care were followed by reductions in birth rates. Once they began, these declines proceeded much more rapidly than they did in the developed countries.

The fact that death rates decline before birth rates has led to a population explosion in developing countries over the past 50 years.

Even if the underlying causes of rapid population growth were to suddenly disappear, humanity would continue to experience demographic change for some time to come. Rapid increases in the global population over the past few decades have resulted in large numbers of people of child-bearing age (whose children form an “echo” generation). This creates “population momentum,” where the populations of most countries, even those with falling birth rates, will grow for many years, particularly in developing countries.

These changes have huge implications for the pace of economic development. Economic analysis has tended to focus on the issue of population numbers and growth rates as factors that can put pressure on scarce resources, dilute the capital-labor ratio, or lead to economies of scale. However, demographic change has important additional dimensions. Increasing average life expectancy can change life-cycle behavior affecting education, retirement, and savings decisions—potentially boosting the financial capital on which investors draw and the human capital that strengthens economies. Demographic





change also affects population age structure, altering the ratio of workers to dependents.

This issue of *F&D* looks at many facets of the impact of demographic change on the global economy and examines the policy adjustments needed in both the developed and the developing world.

### Sharp rise in global population

The global population, which stood at just over 2.5 billion in 1950, has risen to 6.5 billion today, with 76 million new inhabitants added each year (representing the difference, in 2005, for example, between 134 million births and 58 million deaths). Although this growth is slowing, middle-ground projections suggest the world will have 9.1 billion inhabitants by 2050 (see “Global Demographic Trends” on page 14).

These past and projected additions to world population have been, and will increasingly be, distributed unevenly across the world. Today, 95 percent of population growth occurs in developing countries. The populations of the world’s 50 least developed countries are expected to more than double by the middle of this century, with several poor countries tripling their populations over the period. By contrast, the population of the developed world is expected to remain steady at about 1.2 billion, with declines in some wealthy countries.

The disparity in population growth between developed and developing countries reflects the considerable heterogeneity in birth, death, and migration processes, both over time and across national populations, races, and ethnic groups. The disparity has also coincided with changes in the age composition of populations. An overview of these factors illuminates the mechanisms of population growth and change around the world.

**Total fertility rate.** The total world fertility rate, that is, the number of children born per woman, fell from about 5 in 1950 to a little over 2.5 in 2006 (see Chart 1). This number is projected to fall to about 2 by 2050. This decrease is attributable largely to changes in fertility in the developing world and can be ascribed to a number of factors, including declines in infant mortality rates, greater levels of female education and increased labor market opportunities, and the provision of family-planning services.

**Infant and child mortality decline.** The developing world has seen significant reductions in infant and child mortality over the past 50 years. These gains are primarily the result of improved nutrition, public health interventions related to water and sanitation, and medical advances, such as the use of vaccines and antibiotics. Infant mortality (death prior to age 1) in developing countries has dropped from 180 to about 57 deaths per 1,000 live births. It is projected to decline to fewer than 30 by 2050. By contrast, developed countries have seen infant mortality decline from 59 deaths per 1,000 live births to 7 since 1950, and this is projected to decline further still, to 4 by 2050. Child mortality (death prior to age 5) has also fallen in both developed and developing countries.

**Life expectancy and longevity.** For the world as a whole, life expectancy increased from 47 years in 1950–55 to 65 years in 2000–05. It is projected to rise to 75 years by the middle of this century, with considerable disparities between the wealthy industrial countries, at 82 years, and the less developed countries, at 74 years (see Chart 2). (Two major exceptions to the upward trend are sub-Saharan Africa, where the AIDS epidemic has drastically lowered life expectancy, and some of the countries of the former Soviet Union, where economic dislocations have led to significant health problems.) As a result of the global decline in fertility, and because people are living longer, the proportion of the elderly in the total population is rising sharply. The number of people over the age

of 60, currently about half the number of those aged 15 to 24, is expected to reach 1 billion (overtaking the 15–24 age group) by 2020 and almost 2 billion by 2050. The proportion of individuals aged 80 or over is projected to rise from 1 percent to 4 percent of the global population by 2050.

**Age distribution: working-age population.** Baby booms have altered the demographic landscape in many countries. As the experiences of several regions during the past century

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show, an initial fall in mortality rates creates a boom generation in which high survival rates lead to more people at young ages than in earlier generations. Fertility rates fall over time, as parents realize they do not need to give birth to as many children to reach their desired family size, or as desired family size contracts for other reasons. When fertility falls and the baby boom stops, the age structure of the population then shows a “bulge” or baby-boom age cohort created by the nonsynchronous falls in mortality and fertility. As this generation moves through the population age structure, it constitutes a share of the population larger than the cohorts that precede or follow. This creates particular challenges and opportunities for countries, such as a large youth cohort to be educated, followed by an unusually large working-age (approximately ages 15–64) population, with the prospect of a “demographic dividend,” and characterized eventually by a large elderly population, which may burden the health and pension systems (see Chart 3 and “What Is the Demographic Dividend?” on page 16).

**Migration.** Migration also alters population patterns. Globally, 191 million people live in countries other than the one in which they were born. On average during the next 45 years, the United Nations projects that over 2.2 million individuals will migrate annually from developing to developed countries. It also projects that the United States will receive by far the largest number of immigrants (1.1 million a year), and China, Mexico, India, the Philippines, and Indonesia will be the main sources of emigrants (see “Global Migration” on page 23).

**Urbanization.** In both developed and developing countries, there has been huge movement from rural to urban areas since 1950. Less developed regions, in aggregate, have seen their population shift from 18 percent to 44 percent urban, while the corresponding figures for developed countries are 52 percent to 75 percent. A new UN report says that in 2007 the worldwide balance will tip and more than half of all people will be living in urban areas. This shift—and the concomitant urbanization of areas that were formerly peri-urban or rural—is consistent with the shift in most countries away from agriculturally based economies.

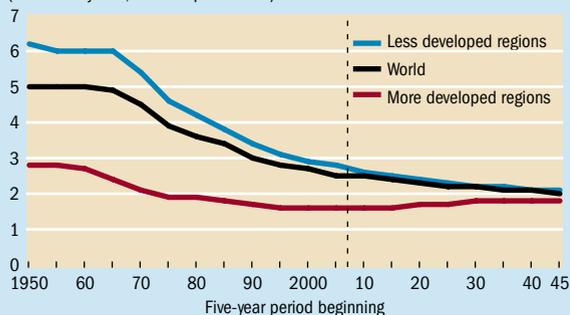
The existence and growth of megacities (that is, those with 10 million or more residents) is a late-20th-century phenomenon that has brought with it special problems. There were 20 such cities in 2003, 15 in developing countries. Tokyo is by far the largest, with 35 million people, followed by (in descending order) Mexico City, New York, São Paulo, and Mumbai (all with 17 to 19 million). Cities in general allow for economies of scale—and, most often, for a salutary mix of activities, resources, and people—that make them centers of economic growth and activity and account, in some measure, for their attractiveness. As continued movement to urban areas leads to megacities, however, these economies of scale and of agglomeration seem to be countered, to some extent, by problems that arise in transportation, housing, air pollution, and waste management. In some instances, socioeconomic disparities are particularly exacerbated in megacities.

Chart 1

### Smaller families

Fertility rates are tending to converge at lower levels after earlier sharp declines.

(total fertility rate; children per woman)



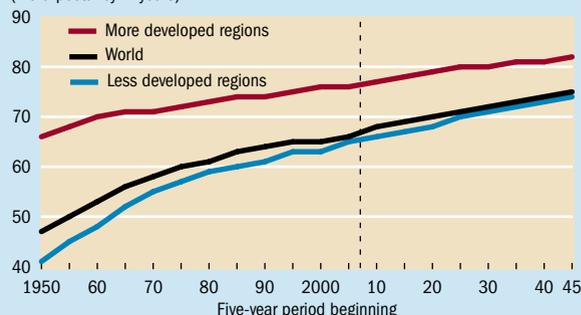
Source: United Nations, *World Population Prospects*, 2004.

Chart 2

### Living longer

Life expectancy is continuing to rise, but there are big differences between rates in well-off and poorer countries.

(life expectancy in years)

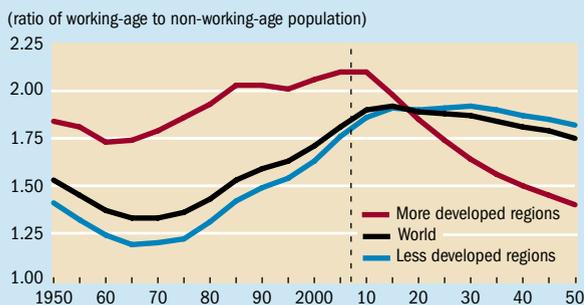


Source: United Nations, *World Population Prospects*, 2004.

Chart 3

### Tracking the bulge

Developing countries are nearing the peak of their opportunity to benefit from a high ratio of workers to dependents.



Source: United Nations, *World Population Prospects*, 2004.

### What is the impact on economies?

The economic consequences of population growth have long been the subject of debate. Early views on the topic, pioneered by Thomas Malthus, held that population growth would lead to the exhaustion of resources. In the 1960s, it was proposed that population growth aided economic development by spurring technological and institutional innovation and increasing the supply of human ingenuity. Toward the end of the 1960s, a neo-Malthusian view, focusing again on the dangers of population growth, became popular. Population control policies in China and India, while differing greatly from each other, can be seen in this light. Population neutralism, a middle-ground view, based on empirical analysis of the link between population growth and economic performance, has held sway for the past two decades. According to this view, the net impact of population growth on economic growth is negligible.

Population neutralism is only recently giving way to a more fine-grained view of the effects of population dynamics in which demographic change *does* contribute to or detract from economic development. To make their case, economists and demographers point to both the “arithmetic accounting” effects of age structure change and the effects of behavioral change caused by longer life spans (see box, page 12).

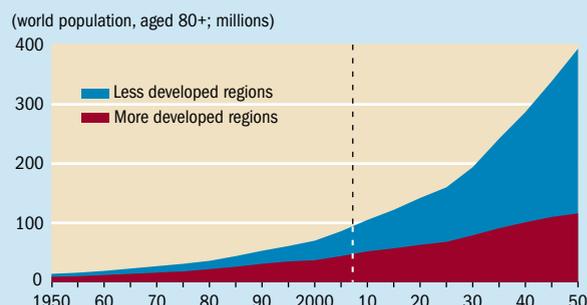
**Arithmetic accounting effects.** These effects assume constant behavior within age and sex groups, but allow for changes in the relative size of those groups to influence overall outcomes. For example, holding age- and sex-specific labor force participation rates constant, a change in age structure affects total labor supply.

As a country’s baby-boom generation gets older, for a time it constitutes a large cohort of working-age individuals and, later, a large cohort of elderly people. The span of years represented by the boom generation (which determines how quickly this cohort moves through the age structure) and the size of the population bulge vary greatly from one country to another. In all circumstances, there are reasons to think that this very dynamic age structure will have economic consequences. A historically high proportion of working-age

Chart 4

### Retiree boom

The number of people living past 80 is projected to rise sharply, but labor shortages could drive up living costs for retirees.



Source: United Nations, *World Population Prospects*, 2004.

individuals in a population means that, potentially, there are more workers per dependent than previously. Production can therefore increase relative to consumption, and GDP per capita can receive a boost.

Life-cycle patterns in savings also come into play as a population’s age structure changes. People save more during their working-age years, and if the working-age cohort is much larger than other age groups, savings per capita will increase.

**Behavioral effects.** Declining rates of adult mortality and the movement of large cohorts through the global population pyramid will lead to a massive expansion in the proportion of elderly in the world population (see the projections for 2050 in Chart 4). Some simple economic projections show catastrophic effects of this aging. But such projections tend to be based on an “accounting” approach, which assumes that age-specific behavior remains unchanged and ignores the potentially significant effects of behavior change.

The aging of the baby-boom generation potentially promotes labor shortages, creating upward pressure on wages and downward pressure on the real incomes of retirees. In response, people may adjust their behavior, resulting in increased labor force participation, the immigration of workers from developing countries, and longer working lives. Child mortality declines can also have behavioral effects, particularly for women, who tend to be the primary caregivers for children. When the reduced fertility effect of a decrease in child mortality is in place, more women participate in the workforce, further boosting the labor supply.

### The missing link

Demographic effects are a key missing link in many macroeconomic analyses that aim to explain cross-country differences in economic growth and poverty reduction. Several empirical studies show the importance of demographics in explaining economic development.

**East Asia’s baby boom.** East Asia’s remarkable economic growth in the past half century coincided closely with demographic change in the region. As infant mortality fell from

181 to 34 per 1,000 births between 1950 and 2000, fertility fell from six to two children per woman. The lag between falls in mortality and fertility created a baby-boom generation: between 1965 and 1990, the region's working-age population grew nearly four times faster than the dependent population. Several studies have estimated that this demographic shift was responsible for one-third of East Asia's economic growth during the period (a welcome demographic dividend).

**Labor supply and the Celtic Tiger.** From 1960 to 1990, the growth rate of income per capita in Ireland was approximately 3.5 percent a year. In the 1990s, it jumped to 5.8 percent, well in excess of any other European economy. Demographic change contributed to the country's economic surge. In the decade following the legalization of contraceptives in 1979, Ireland saw a sharp fall in the crude birth rate. This led to decreasing youth dependency and a rise in the working-age share of the total population. By the mid-1990s, the dependency burden in Ireland had dropped to a level below that in the United Kingdom.

Two additional demography-based factors also helped fuel economic growth by increasing labor supply per capita. First, while male labor force participation rates remained fairly static, the period 1980–2000 saw a substantial increase in female labor force participation rates, particularly among those aged between 25 and 40. Second, Ireland historically had high emigration levels among young adults (about 1 percent of the population a year) because its economy was unable to absorb the large number of young workers created by its high fertility rate. The loss of these young workers exacerbated the problem of the high youth dependency rate. The decline in youth cohort sizes and rapid economic growth of the 1990s led to a reversal of this flow, resulting in net in-migration of workers, made up partly of return migrants and also, for the first time, substantial numbers of foreign immigrants.

**Continued high fertility in sub-Saharan Africa.** Demographic change of a very different type can account for slow economic development. Much of sub-Saharan Africa remains stalled at the first stage of a demographic transition. Fertility rates actually increased a bit from the 1950s through the 1970s and only recently have begun a slow fall. As swollen youth cohorts have entered the labor force, an inadequate policy and economic environment in most countries has prevented many young people from being able to engage in productive employment. The existence of large dependent populations (in this case, of children) has kept the proportion of working-age people low, making it more difficult for these economies to rise out of poverty.

### Looking to the future

Based on the indicators that are available, we can make a few important points:

- **All signs point to continued but slowing population growth.** This growth will result in the addition of roughly 2.5 billion people to the world population, before it stabilizes around 2050 at about 9 billion. Managing this increase will be an enormous challenge, and the economic consequences of failing to do so could be severe.

- **The world's population is aging rapidly.** The United Nations predicts that 31 percent of China's population in 2050—432 million people—will be age 60 or older. The corresponding figures for India are 21 percent and 330 million. No longer can aging be thought of as just a developed-world phenomenon.

- **International migration will continue, but the extent is unclear.** The pressures that encourage people to migrate—above all, the lure of greater economic well-being in the developed countries—will undoubtedly persist, but the strength of countervailing policy restrictions that could substantially stanch the flow of migrants is impossible to predict.

### How much can the human life span be stretched?

In most of the world, children born today can expect to live for many decades longer than their ancestors born in the 19th or early 20th centuries. In Japan, life expectancy at birth is now 82 years, and other regions have also made great progress as medical and public health advances, improved nutrition, and behavioral changes encouraged by improved education have combined to reduce the risk of death at all ages. But how far can these increases in longevity go?

Continuing increases in life expectancy in low-mortality populations have led some demographers to forecast further gains. Kenneth Manton, Eric Stallard, and H. Dennis Tolley, for example, estimate that populations with extremely healthy lifestyles—that is, with an absence or near-absence of risk factors such as infectious disease, smoking, alcohol abuse, and obesity, and the presence of health-promoting behaviors such as a healthy diet and exercise—could achieve a life expectancy of between 95 and 100 years.

But others have reached different conclusions. Nan Li and Ronald Lee estimate that life expectancy in the United States

will rise from a 1996 figure of 76.3 to 84.9 by 2050, with that in Japan rising from 80.5 to 88.1. S. Jay Olshansky, Bruce Carnes, and Aline Desesquelles predicted in 1990 that life expectancy at birth would not surpass 85 years, even in low-mortality settings. Death rates, they argued, would not fall sufficiently for life expectancy to rise rapidly, and earlier increases were driven largely by dramatic reductions in infant and child mortality, which could not recur (Samuel Preston, on the other hand, observes that 60 percent of the life expectancy increase in the United States since 1950 is due to mortality declines in people over the age of 50). Perhaps more important, they saw no reason why the future should necessarily mirror the past—new threats to health such as influenza pandemics, antibiotic resistance, and obesity could reverse gains made in recent decades; technological improvements could stall and the drugs needed to counter the diseases of aging might not be found; and environmental disasters, economic collapse, or war could derail health systems at the same time that they weaken individuals' ability to protect their own health.

• *Urbanization will continue, but the pace is also hard to predict.* Greater economic opportunities in the cities will surely continue to attract migrants from rural areas, but environmental and social problems may stymie growth.

### Getting the focus right

Rapid and significant demographic change places new demands on national and international policymaking. Transitions from high mortality and fertility to low mortality and fertility can be beneficial to economies as large baby-boom cohorts enter the workforce and save for retirement. Rising longevity also tends to increase the incentives to save for old age.

The ability of countries to realize the potential benefits of the demographic transition and to mitigate the negative effects of aging depends crucially on the policy and institutional environment. Focusing on the following areas is likely to be key:

**Health and nutrition.** Although it has long been known that increased income leads to improved health, recent evidence indicates that good health may also be an important factor in economic development. Good nutrition in children is essential for brain development and for allowing them to become productive members of society. Health improvements—especially among infants and children—often lead to declines in fertility, above and beyond the heightened quality of life they imply. Focusing on the diseases of childhood can therefore increase the likelihood of creating a boom generation and certain positive economic effects. Countries wishing to accelerate fertility declines may benefit from focusing on access to family-planning services and education about fertility decisions.

**Education.** Children are better able to contribute to economic growth as they enter the workforce if they have received an effective education. East Asia capitalized on its baby boom by giving its children a high-quality education, including both general schooling and technical skills, that equipped them to meet the demands of an ever-changing labor market. Ireland also profited from its baby boomers by introducing free secondary schooling and expanding tertiary education.

**Labor market institutions.** Restrictive labor laws can limit a country's ability to benefit from demographic change, particularly when they make it unduly difficult to hire and fire workers or to work part-time. International outsourcing, another controversial subject, may become an increasingly important means of meeting the demand for labor.

**Trade.** One way that East Asian countries provided their baby-boom cohorts with productive opportunities was by carefully opening up to international trade. By providing a new avenue for selling the region's output, this opening helped countries avoid the unemployment that could have arisen. We have found that open economies benefit much

more from demographic change than the average, and that closed economies do not derive any statistically significant benefit from age structure changes.

**Retirement.** Population aging will require increased savings to finance longer retirements. This will likely affect financial markets, rates of return, and investment. In addition, as more people move into old age, health care costs will tend to increase, with the expansion of health care systems and growth in long-term care for the elderly. As nontradable, labor-intensive sectors with a low rate of technical progress, health care and elder care may slow economic growth. The ability of individuals to contribute to the financing of their retirement may be hampered by existing social security systems, many of which effectively penalize individuals who work beyond a fixed retirement age.

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Although demographic changes are generally easier to predict than economic changes, the big picture outlook is nonetheless unclear. Indeed, many forces that affect the world's demographic profile are highly unpredictable. Will an outbreak of avian flu or another disease become pandemic, killing many millions and decimating economies? What happens if these diseases are, or become, drug-resistant? Conversely, scientific advances in areas such as genomics, contraceptive methods, or vaccines for diseases such as AIDS or malaria could save and improve millions of lives. Global warming and other environmental change could completely alter the context of demographic and economic predictions. Or—to take things to extremes—wars could result in massive premature mortality, thereby rendering irrelevant most predictions about demographic and related economic changes. ■

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For references to additional papers cited herein and a short bibliography, see the Internet version of this article at [www.imf.org/fandd](http://www.imf.org/fandd).