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ABSTRACT

For decades, economists and social thinkers have debated the influence of population change on economic growth. Three alternative positions define this debate: that population growth restricts, promotes, or is independent of economic growth. Proponents of each explanation can find evidence to support their cases. All of these explanations, however, focus on population *size* and *growth*. In recent years, however, the debate has under-emphasized a critical issue, the *age structure* of the population (that is, the way in which the population is distributed across different age groups), which can change dramatically as the population grows. Because people's economic behavior varies at different stages of life, changes in a country's age structure can have significant effects on its economic performance. Nations with a high proportion of children are likely to devote a high proportion of resources to their care, which tends to depress the pace of economic growth. By contrast, if most of a nation's population falls within the working ages, the added productivity of this group can produce a "demographic dividend" of economic growth, assuming that policies to take advantage of this are in place. In fact, the combined effect of this large working-age population and health, family, labor, financial, and human capital policies can create virtuous cycles of wealth creation. And if a large proportion of a nation's population consists of the elderly, the effects can be similar to those of a very young population. A large share of resources is needed by a relatively less productive segment of the population, which likewise can inhibit economic growth. After tracing the history of theories of the effects of population growth, this report reviews evidence on the relevance of changes in *age structure* for economic growth. It also examines the relationship between population change and economic development in particular regions of the world: East Asia; Japan; OECD, North America and Western Europe; South-central and Southeast Asia; Latin America; Middle East and North Africa; Sub-Saharan Africa; and Eastern Europe and the former Soviet Union. Finally, it discusses the key policy variables that, combined with reduced fertility and increases in the working-age population, have contributed to economic growth in some areas of the developing world.

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Summary

DEMOGRAPHIC CHANGE AND ECONOMIC GROWTH: THE IMPORTANCE OF AGE STRUCTURE

For decades, economists and social thinkers have debated the influence of population change on economic growth.⁵ Three alternative positions define this debate: that population growth restricts, promotes, or is independent of economic growth. Proponents of each explanation can find evidence to support their cases.⁶ All of these explanations, however, focus on population *size* and *growth*. In recent years, however, the debate has under-emphasized a critical issue, the *age structure* of the population (that is, the way in which the population is distributed across different age groups), which can change dramatically as the population grows.⁷

Because people's economic behavior varies at different stages of life, changes in a country's age structure can have significant effects on its economic performance. Nations with a high proportion of children are likely to devote a high proportion of resources to their care, which tends to depress the pace of economic growth. By contrast, if most of a nation's population falls within the working ages, the added productivity of this group can produce a "demographic dividend" of economic growth, assuming that policies to take advantage of this are in place. In fact, the combined effect of this large working-age population and health, family, labor, financial, and human capital policies can create virtuous cycles of wealth creation. And if a large proportion of a nation's population

⁵ A recent and very important summary of the history, along with a set of well-focused essays on the subjects treated in this essay is Birdsall, Nancy, Allen C. Kelley, and Steven W. Sinding, eds., *Population Matters: Demographic Change, Economic Growth, and Poverty in the Developing World*. Oxford University Press, 2001.

⁶ The issue is further complicated because some research has shown that the relationship is different in developing countries than in developed countries. See Allen Kelley, 2001, "The Population Debate in Historical Perspective: Revisionism Revised," p. 46. In Birdsall, N., Kelley, A., and Sinding, S. eds. *Population Matters: Demography, Growth, and Poverty in the Developing World*, pp. 24-54. Oxford University Press.

⁷ In fact, considerations of age structure were not entirely absent from these debates. Most notably, the seminal work by Coale and Hoover (1958) suggested that population growth impeded economic growth partly because it goes hand in hand with increased youth dependency.

consists of the elderly, the effects can be similar to those of a very young population. A large share of resources is needed by a relatively less productive segment of the population, which likewise can inhibit economic growth.

After tracing the history of theories of the effects of population growth, this report reviews evidence on the relevance of changes in *age structure* for economic growth. It also examines the relationship between population change and economic development in particular regions of the world: East Asia; Japan; OECD, North America and Western Europe; South-central and Southeast Asia; Latin America; Middle East and North Africa; Sub-Saharan Africa; and Eastern Europe and the former Soviet Union. Finally, it discusses the key policy variables that, combined with reduced fertility and increases in the working-age population, have contributed to economic growth in some areas of the developing world.⁸

THE DEMOGRAPHIC TRANSITION AND THE DEMOGRAPHIC "DIVIDEND"

The relationship between population change and economic growth has taken on added salience in recent years because of demographic trends in the developing world. At varying rates and times since the Second World War, developing countries have been undergoing a demographic transition, from high to low rates of mortality and fertility. This transition is producing a "boom" generation – a generation that is larger than those immediately before and after it – that is gradually working its way through nations' age structures. The East Asian nations were at the forefront of this transition; other regions, including Latin America, began their transitions later, in the 1960s and '70s. Yet other areas – notably some countries in the Middle East and Africa – have not yet fully begun, or are in the early phases of this transition.

⁸ The text, tables, and figures for this paper draw heavily on United Nations, World Population Prospects: The 2000 Revision. Unless otherwise noted, we use the UN's "medium variant" for all data. The UN's methodology has been criticized for its reliance on the assumption that all countries will converge to a fertility rate of 2.1 children per woman. The concern here is that this suggests fertility will rise in quite a few countries where the total fertility rate is currently below the replacement level of 2.1. Regardless of the merits of this critique, we note that most of the results presented in this paper are qualitatively insensitive to the difference between the "medium" and "low-fertility" variants of the data.

THE ESSENTIAL POLICY ENVIRONMENT

Nations undergoing this transition have an opportunity to capitalize on the “demographic dividend” offered by the maturing of formerly young populations. The demographic dividend is not, however, automatic. Given the right kind of policy environment, this demographic dividend can help to produce a sustained period of economic growth, as it did in several East Asian economies. The critical policy areas include

- Public health
- Family planning
- Education
- Economic policies that promote labor-market flexibility, openness to trade, and savings.

Policymakers in developing countries have a window of opportunity for exploiting the maturation of previously young populations. Policymakers should consider how to maximize and capture this dividend by accelerating the demographic transition, and allowing extra labor to be absorbed productively in the market. Finally, policymakers must plan for the future health care and pension income needs of this baby boom generation when it ages. The demographic transition offers policymakers a window of opportunity. Seizing it could prove vital to the economic and social development of their countries.

Before proceeding, note that policies that enhance the free operation of markets are frequently referred to, below. In most simple economic models, such policies will tend to promote a country's ability to take advantage of the demographic dividend. However, two caveats are in order.

First, policy reforms that make labor markets more flexible are not unambiguously beneficial, especially in the short run. Political feasibility can also be an issue. Workers

who suffer pay reductions, who are displaced, or who fear these outcomes can be a potent political force resisting change. In principle, social protection programs can ease the impact of labor market reforms, but there are few successful models to which one can point (see, for example, Lustig (2001)). Nevertheless, capture of the potential demographic dividend can be impeded by labor market rigidities that pervade many developing countries. These include rules governing the hiring and firing of individuals that prevent employers from taking risks and thus deter investment; minimum wages that exceed market rates and thereby discourage hiring and training; government pay practices that are grossly out of line with the market; and labor market inertia caused by labor-management bargaining.

Second, similar issues arise with respect to free trade, since it is well established that trade liberalization creates both winners and losers. Openness to trade can provoke economic adjustments that lead to unemployment and poverty. There are also some important issues about the fundamental fairness of outcomes that result when countries become more integrated into the world economy. These questions relate, for example, to intellectual property rights, immigration restrictions, and developed country protectionism.

Devising economically and politically realistic programs to deal with these challenges is hugely important, though beyond the scope of this report.

Chapter 1 The Debate over the Effects of Population Change on Economic Growth

The relationship between population change and economic growth remains a subject of debate among economists and demographers. They continue to disagree about whether population change is (a) restricts, (b) promotes, or (c) is independent of economic growth. Proponents of each view can point to research evidence to support their cases.

The utility of this debate has been hampered by one shortcoming: its almost exclusive focus on population *size* and *growth*. Little attention has been paid to a critical variable, the *age structure* of the population (that is, the way in which the population is distributed across different age groups) and how it changes when populations grow.

This report attempts to address this limitation. It reviews the debate over the effects of demographic change on economic growth and examines the evidence on the relevance of changes in age structure for economic growth. It also examines the relationship between population change and economic development in particular regions of the world. Finally, it discusses key policies that, combined with reduced fertility and increases in the working-age population, have contributed to economic growth in the developing world.

Understanding the relationship between population change and economic growth has taken on immense significance in recent years because of demographic trends in the developing world. The world's developing countries – home to the vast majority of the world's population – are in varying stages of a demographic transition from high to low rates of mortality and fertility. This transition is producing a boom generation that is gradually working its way through nations' age structures. In conjunction with the right kinds of policies, this phenomenon creates opportunities for economic growth in developing countries. For this reason, policymakers should benefit from a clearer understanding of the relationship between economic development and the shifting age structure that results from the unfolding demographic transition.

THE “PESSIMISTIC” THEORY: POPULATION GROWTH RESTRICTS ECONOMIC DEVELOPMENT

Following the Second World War, rapid population growth, resulting from the gap between declining mortality and continuing high fertility, began occurring in much of Asia. By the mid-1960s, more countries, including a number in Latin America and the Middle East, were experiencing unprecedented rates of population growth. At such rates, their populations would double in less than 25 years.⁹

Concerns about rapid population growth voiced by demographers, social scientists, and others were based largely on the assumption that such growth would “serve as a brake” on economic development.¹⁰ In the late 1940s, conservationists began to write about excessive population growth being a threat to food supplies and natural resources. Concerns about the impact of rapid population growth and high fertility underlay the widespread implementation of family planning programs in many areas of the developing world (see Seltzer, RAND, forthcoming 2001). Policymakers presumed that by helping to reduce high fertility, family planning programs would slow population growth, which in turn would contribute to improved economic performance by freeing resources that otherwise would be devoted to child-rearing as well as reducing strains on infrastructure and the environment.

The “pessimistic” theory traces its lineage to Thomas Malthus. Writing in the 1790s, Malthus asked whether “the future improvement of society” was possible in the face of ever larger populations. He reached his famously dismal conclusion:

“Taking the population of the world at any number, a thousand millions, for instance...the human species would increase in the ratio of 1, 2, 4, 8, 16, 32, 64, 128, 256, 516, etc. and subsistence as 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, etc. In two centuries and a quarter the

⁹ Some of these countries, in fact, more than doubled their population between 1965 and 1990, while some of them saw their growth rate slow down.

¹⁰ For a discussion of trends in global population growth since the 1950s and the implications of high fertility for economic growth, see Bulatao, 1998, pp. 3-20.

population would be to the means of subsistence as 512 to 10; in three centuries as 4096 to 13, and in two thousand years the difference would be incalculable."¹¹

In a world with fixed resources for growing food, and slow technical progress, Malthus theorized, food production would quickly be swamped by the pressures of a rapidly growing population. The available diet would then fall below subsistence level, until population growth was halted by a high death rate. Living standards could only ever improve in the short term – before they set in motion more rapid population growth. The balance between population and income growth was the “great law of our nature.” Accordingly, “No fancied equality, no agrarian regulations in their utmost extent, could remove the pressure of it even for a single century. And it appears, therefore, to be decisive against the possible existence of a society, all the members of which should live in ease, happiness, and comparative leisure; and feel no anxiety about providing the means of subsistence for themselves and families.”¹²

Malthus’s pessimism remains with us. In 1968, for instance, Paul Ehrlich opened his influential book “The Population Bomb” with the words, “The battle...is over. In the 1970s hundreds of millions of people are going to starve to death.”¹³ More measured studies undertaken by the US National Academy of Sciences (NAS) in 1971 and the United Nations in 1973 also predicted that the net effect of population growth would be negative.¹⁴ Rapid population growth continues to press on the modern consciousness. The world’s population has grown sixfold since 1800, when it stood at about one billion. It took less than 130 years to add another billion. Things have quickened considerably since. The 6 billionth baby was born in October 1999 – and world population is forecast to be 9.3 billion people by the year 2050 (see Table 1). Table 2 shows the current

¹¹ Malthus, T. R. (1798). *Essay on the Principle of Population, As It Affects the Future Improvement of Society with Remarks on the Speculation of Mr. Godwin, M. Condorcet, and Other Writers*, Penguin Classics ed. (Harmondsworth, 1982).

¹² Ibid.

¹³ Ehrlich, P. 1968. *The Population Bomb*. New York: Ballantine

¹⁴ National Academy of Sciences (1971): *Rapid population growth: consequences and policy implications*. 2 volumes. Baltimore: John Hopkins Press for the National Academy of Sciences; United Nations (1973): *The determinants and consequences of population trends*. Department of Economic and Social Affairs, Population studies NO 50. 2 volumes. New York: United Nations.

population of all regions and countries, along with the share of the world's total population in each region. With the population of many developed countries decreasing by 2050, all of this explosive population growth is happening in developing countries¹⁵ (see Figure 1) – most rapidly in those geographic regions that are most fragile and least hospitable (due to adverse climate, lack of resources, or unfavorable location) to economic growth¹⁶ – encouraging predictions of demographic catastrophe.

For a time, it seemed the pessimists had the right answer. Innovations in agriculture, such as irrigation in China and potato cultivation in Ireland, were accompanied by vast increases in population that hampered improvements in living standards. Until 1700, income gaps between countries were fairly small and, even in 1820, real income levels in the advanced European nations were only about two to three times those found in Africa, Asia, and Latin America (see Figure 2).

In addition to the effect of population numbers on the demand for fixed resources, there is also a potentially negative impact of population growth on capital intensity. In principle, higher population numbers require more homes, factories and infrastructure to house, employ and provide for their needs. In the long run such capital can be constructed, but periods of rapid population growth may well lead to reductions in capital per worker and lower living standards. When population growth is rapid, a large part of investment is used to supply the needs of the growing population rather than enabling an increase in the level of provision per capita.

Both these theories give grounds for pessimism. However, by the early 1980s economists were beginning to reject the pessimist view. Empirical research had weakened the pessimists' case; economic theory had begun to give increasing importance to technology and human capital accumulation compared to the old key growth factors of physical capital; and demographic theory started to look to the intermediate and long term, where the short-term effects of population growth were likely to have at least partly smoothed

¹⁵ UN Population Division: World Population Prospects – The 2000 Revision. 28 February 2001: 6

out.¹⁷ In response to these developments, organizations like the National Academy of Sciences began to revise their earlier views, as economists, with their greater faith in markets' ability to respond to population growth, gained prominence over the social and biological scientists who previously dominated population thinking.¹⁸

THE "OPTIMISTIC" THEORY: POPULATION CHANGE CAN FUEL ECONOMIC GROWTH

Recent history has cast further doubt on the pessimists' theory. In the last 30 years – when the world's population has doubled – per capita incomes have increased by about two thirds. Famines have occurred, but Ehrlich's "hundreds of millions" of people have not starved; the famines that have occurred were largely caused by poverty and lack of funds among a section of the population to buy food rather than any absolute shortage of food (as Amartya Sen has noted, there has never been a famine in a functioning democracy, whatever its population growth rate¹⁹). Technological progress, in both agriculture and industry, has been more rapid than any other time in human history. There have been equally dramatic social and institutional innovations, in the way people work, the standard of their education and health and the extent to which they participate in the political process²⁰. Rather than being constrained by fixed resources, the prices of many raw materials are in long-term decline, and some parts of the economy are becoming "dematerialized" as knowledge becomes an increasingly vital asset.²¹

¹⁶ Jeffrey D Sachs, Andrew D Mellinger and John L Gallup: The Geography of Poverty and Wealth. Scientific American March 2001

¹⁷ On the importance of human capital in explaining differences in standards of living across countries, see Mankiw, Romer, and Weil (1992). On demographics, see Allen C Kelley (2001): The population debate in historical perspective: revisionism revisited. In *Population Matters: Demography, Growth, and Poverty in the Developing World*, Nancy Birdsall, Allen C. Kelley and Steven Sinding, editors, Oxford University Press, 2001.

¹⁸ National Research Council (1986): Population growth and economic development: policy questions. Washington, DC: National Academy Press, cited in Kelley (2001): *ibid*

¹⁹ Amartya Sen (1999): *Development as Freedom*. Oxford University Press.

²⁰ Amartya Sen: *Development as Freedom*. Knopf 1999; Bloom, David E., Patricia H. Craig and Pia N. Malaney, 2001, *The Quality of Life in Rural Asia*. Oxford University Press.

²¹ World Bank: *World Development Report 1997: The State in a Changing World*. OUP 1997; Task Force on Higher Education and Society: *Higher Education in Developing Countries: Peril and Promise*. World Bank February 2000

These trends have supported the views of a group of “population optimists” who have sought to promote the idea that population growth can be an economic asset. Simon Kuznets and Julian Simon, for example, argue (separately) that as populations increase, so does the stock of human ingenuity. Larger societies – with the capacity to take advantage of economies of scale – are better positioned to develop, exploit, and disseminate the increased flow of knowledge they receive.²² Simon, in his influential book “The Ultimate Resource”, showed how positive feedbacks – such as the tendency of natural resource prices to decline in the long-term due to technological progress induced by the growing demands of rising populations – can mean that rapid population growth can lead to positive impacts on economic development.²³ Ester Boserup uses similar arguments to turn the Malthusian world-view around. Population growth creates pressure on resources. People are resourceful and are stimulated to innovate, especially in adversity. When rising populations swamped traditional hunter-gatherer arrangements, slash-burn-cultivate agriculture emerged. When that, too, became inadequate, intensive multi-annual cropping was developed.²⁴ More recently the Green Revolution, which has almost quadrupled world food production since 1950 using just 1 percent more land, was a direct reaction to population pressure. “Without high yield agriculture,” comments Norman Borlaug, an initiator of the Green Revolution, “either millions would have starved or increases in food output would have been realized through losses of pristine land a hundred times greater than all losses to urban and suburban expansion.”²⁵

The Optimists, while refuting the alarmist tendencies of the Pessimists’ theory, were not dogmatic about the positive impacts of population growth. Instead, they took a broader view, suggesting that a multiplicity of external factors were responsible for the consequences of population growth. These factors could have either positive or negative

²² Kuznets, S. 1960. Population Change and Aggregate Output. In Universities--National Bureau Committee for Economic Research, Demographic and Economic Change in Developed Countries. Princeton: Princeton University Press.; Kuznets, S. 1967. ‘Population and economic growth’, *Proceedings of the American Philosophical Society* 111, 170–93.

²³ Simon, Julian L (1981): The Ultimate Resource. Princeton: Princeton University Press.

²⁴ Boserup, E. 1965. The Conditions of Agricultural Progress. London: Allen and Unwin; Boserup, E. 1981. Population and Technological Change: A Study of Long-Term Trends. Chicago: University of Chicago Press.

²⁵ uk@earth.people, Department for International Development, United Kingdom, 1997.

economic consequences – as TN Srinivasan said: “many of the alleged deleterious consequences result more from inappropriate policies and institutions than from rapid population growth.”²⁶ This broadening of the discussion on population growth eventually led to population *neutralism* emerging as the dominant view in the demographic debate.²⁷

THE “NEUTRALIST” THEORY: POPULATION CHANGE HAS NO SIGNIFICANT EFFECT ON ECONOMIC GROWTH

In his great "Inquiry into the Nature and Causes of the Wealth of Nations" (1776), Adam Smith asked why some countries were richer than others. He found his answer in the division of labor, which allowed workers to become more productive by honing their skills at ever more specialized tasks. In recent years, economists considering the economic effects of demographic change have been more interested in Adam Smith, and his narrative of the power of the market, than in Thomas Malthus's dire predictions about population. Most economic analysis has examined the statistical correlation between population and economic growth and found little significant connection. Though countries with rapidly growing populations tend to have more slowly growing economies (see Figure 3), this negative correlation typically disappears (or even reverses direction) once other factors such as country size, openness to trade²⁸, educational attainment of the population, and the quality of civil and political institutions are taken into account (see Figure 4). In other words, when controlling for other factors, there is little cross-country evidence that population growth impedes economic growth.²⁹ This result seems to justify a third view, population neutralism.

²⁶ TN Srinivasan (1988): Population growth and economic development. *Journal of Policy Modeling*. Spring, 10 (1), pp 7-28.

²⁷ A more recent position is that of Galor and Weil (1999) who propose that the Malthusian and growth regimes should not be seen as competitors but rather, respectively, the beginning and end of a historical process. The world begins in the Malthusian regime and eventually evolves from an intermediate stage they call Post-Malthusian, into the current Modern Growth Regime.

²⁸ Sachs and Warner (1995) judge openness to trade on the basis of tariffs, quotas and licensing, black market premia, and export taxes.

²⁹ This result, however, refers to the average experience across countries. The economic performance of any specific country, however, will be determined by many forces.

The neutralist theory is the dominant view today. Although there are some variations within the neutralist school, with the NAS concluding in 1986 that, "*on balance...slower population growth would be beneficial to economic development of most developing countries*"³⁰ (our italics), and the World Bank suggesting that in some countries bigger populations can boost economic growth, the overall tendency is to accord population issues a relatively minor place in the context of the wider policy environment.

Allen Kelley has suggested that population neutralism has in fact been the predominant school in thinking among academics about population growth for the last half-century; for example, the academic background papers to even the most pessimistic UN and NAS reports are much more moderate in tone than the reports themselves.³¹ Kelley cites three major research areas that influenced the rise of population neutralism in the 1980s:

- Natural resources: Exhaustion of natural resources was found not to be as strongly affected by population growth as the Pessimists thought. Technology, conservation, and efficient market allocation of resources all play a part in preserving natural resources, and per capita income has been shown to be a key determinant of supply and demand for these resources.
- Saving: The impact on economic growth of reduced saving as a result of population growth is not borne out by studies.
- Diversification of resources: Where the Pessimists had thought that population growth would lead to a diversion of resources from productive physical capital formation to less economically productive areas such as education and social welfare programs, multi-country studies showed that this did not in fact happen to any great extent.

According to Kelley, these studies, coupled with the impact of Julian Simon's "The Ultimate Resource" on extending demographers' view into the longer term, were crucial in

³⁰ National Research Council (1986): *ibid*

³¹ Kelley (2001): *ibid*

bringing neutralism to the fore, and the theory has since had an enormous influence on policymakers in developing countries and on the international development community. The Reagan Administration and several donor agencies sought to limit lending to population programs and simultaneously appealed to neutralist theory.³²

THE IMPORTANCE OF AGE STRUCTURE

Proponents of population pessimism, optimism, and neutralism can all fall back on theoretical models and more or less robust data to back up their positions. But, as discussed below, the policy environment and the influence of markets and institutions are at least as important as the population growth rate itself in determining whether countries with expanding populations suffer or thrive.

All of these theories, however, tend to ignore a critical dimension of population dynamics: populations' evolving *age structure*. Economists have tended to focus on population *growth*, ignoring the changing age distribution within populations as they grow.³³ Yet these changes are arguably as important as population growth. Each age group in a population behaves differently, with distinct economic consequences: the young require intensive investment in health and education, prime-age adults supply labor and savings, and the aged require health care and retirement income (Figure 5 is a schematic representation of life cycle income and consumption). When the relative size of each of these groups in a population changes, so does the relative intensity of these economic behaviors. (Figure 6 illustrates the period of high population growth preceding the period during which there is a high share of working-age people.) This matters significantly to a

³² World Bank economists for a long time thought that the macroeconomic case for population lending was weak (Steven W Sinding, Professor of Clinical Public Health, Columbia University, personal communications), and excluded population issues from most policy discussions (Tom Merrick, Senior Population and Reproductive Health Adviser, World Bank, personal communications). The Reagan Administration's Mexico City statement in 1984 stated that, "population is neither a positive nor a negative factor" in development, but is neutral. This statement was associated with the new policy of denying federal funding to NGOs that performed or promoted abortion as a means of family planning in other nations. This policy, which had been overturned by President Clinton in 1993, was reinstated by the Bush Administration in January 2001.

³³ The exception was the seminal Coale-Hoover study, which used India and Mexico as case studies to emphasize the costs associated with a high dependency ratio in the early stage of the demographic transition. See Coale, A. and Hoover, E. 1958. *Population Growth and Economic Development in Low Income Countries*. Princeton: Princeton University Press.

country's income growth prospects. Policymakers with a broad view of development and the complex relation between economic and human development must factor these effects of changing age structure into decisions about their countries' future.

This challenge is especially pressing in the developing world. In those countries whose mortality and fertility rates are beginning to fall (South-central Asia and much of Sub-Saharan Africa, for example), there is an opportunity for governments to capitalize on the consequent demographic transition, where the number of working-age adults grows large relative to the dependent population and potentially acts as a major economic spur. Conversely, if the appropriate policy environment is not in place, unemployment and instability may result, and health, education and social welfare systems may come under unbearable strain. Those developing countries whose transition is advanced, on the other hand (Southeast Asia and Latin America), need to look to the future, putting in place policies to cope with an aging population and make the most of the remaining years of low dependency ratios. The next section will go on to assess how countries can make the most of the age structure of their populations.

Chapter 2 Demographic Transitions and the “Demographic Dividend”

This chapter examines the “demographic transition” that all countries experience as economic development progresses, discusses the mechanisms by which its impacts are felt, and highlights the opportunity for economic growth – the “demographic dividend” – that this transition offers to developing nations.

THE DEMOGRAPHIC TRANSITION: DECLINING MORTALITY AND FERTILITY

In much of the developing world, a “demographic transition” transition is under way, accelerating with the declines in mortality that began around the end of the Second World War. Improvements in medicine and public health, including the introduction of antibiotics such as penicillin, treatments for diseases such as tuberculosis and diarrhea, and the use of DDT, which helps control malaria, have contained or eradicated diseases that once killed millions of people.³⁴ This was accompanied by improved sanitation, nutrition, and the wider practice of healthier behaviors. All this gradually led to higher life expectancies, by as much as twenty years in some countries, and naturally to population growth (see Figures 7 and 8). Yet despite higher life expectancies, these countries had populations that were, on average, growing *younger*.³⁵ This is because mortality declines were not evenly distributed across the population. Infectious diseases are particularly ruthless killers of the young, so their containment had the most powerful impact on the mortality of infants and children which fell earlier and more quickly than mortality at other ages (Figure 9 shows the decline in infant mortality rates over time). The larger surviving youth cohorts served to drive down the average age of populations.

³⁴ See Bloom, River Path Associates, and Fang, 2000, “Social Technology and Human Health,” Background paper prepared for Human Development Report 2001.

³⁵ From 1950 to 1960, the median age decreased in all regions and subregions of Africa, Asia, and Latin America. This time period captures the early stages of the demographic transition in most of the developing world. See United Nations, World Population Prospects: The 2000 Revision.

The mortality decline which began the demographic transition has been succeeded by equally dramatic reductions in fertility (see Figure 10). Fertility decisions seem to respond strongly to changes in child mortality as parents realize that if fewer children are likely to die in childhood, they can give birth to fewer children to attain their desired number of offspring. This desire to rein in fertility is reflected in trends in the use of contraceptives. Worldwide, more than half of couples now use contraception, compared with 10% in the 1960s³⁶. In Bangladesh, for example, the percentage of couples using contraception tripled, to 31 percent, in just fourteen years.³⁷

Other changes have reinforced the trend towards lowered fertility, as it becomes advantageous to have smaller families. If children have a higher chance of survival and a long life expectancy, it is wise to invest intensively in them. A major form of investment is education – an investment that becomes more tempting when economic changes are likely to increase the potential returns on education. However, this requires a long-term commitment. In a rural society, children typically start working on the land quite early and become economically productive at a young age. Educating children limits their productivity during childhood (they are at school rather than working). However, with increasing urbanization, children are less likely to be economically productive, while, in a labor market that places a greater premium on skills, education makes a greater difference to their future productivity. Thus urbanization raises the incentive of parents to educate their children at the same time as it reduces the opportunity cost of education in terms of forgone labor income. Education is expensive. It therefore becomes more likely that couples will choose to invest greater resources in fewer children. A greater emphasis on education will inevitably lead to more educated women. This reinforces the likelihood that families will become smaller: women's time becomes more valuable and they are less

³⁶ *uk@earth.people: poverty and the environment*, 1997, Department for International Development, London

³⁷ MD Shahid Ullah and Nitai Chakraborty (1993): Factors affecting the use of contraception in Bangladesh: a multivariate analysis. *Asia Pacific Population Journal*, Vol 8 No 3 (1993, pp 19-30). UNESCAP.

likely to want to spend so much of their adult life bearing and raising children.³⁸ For many reasons, then, smaller families make increasingly sound economic sense once the demographic transition gets underway.³⁹

The decline in mortality and the decline in fertility jointly form the demographic transition – but they are not synchronized. The lag between the two causes population growth – as fertility only begins to decline some time after mortality has dropped (see Figures 11 and 12). This growth at the beginning of the demographic transition has preoccupied the prevailing views of population change and economic growth. However, the demographic transition also has a predictable impact on a country's age structure. At first, there is a cohort of children that includes many who would previously have suffered an early death. This *baby boom* generation is unique: as fertility rates decline and families grow smaller, successive cohorts tend to be smaller. The result is a "bulge" in the age structure, a *demographic wave* that works its way through the population. (Figures 13, 14, and 15 show this moving bulge, and successive waves of it, for developing countries, East Asia, and Ireland, respectively. Figure 16 shows that only the beginnings of such a bulge are evident in Sub-Saharan Africa). First there are many young people, who need to be fed, clothed, housed, cared for medically, and educated. Then they become adults who are more likely to spend only part of the income they generate on their own needs. The rest is used to provide for children or is saved, most often for retirement. Finally, there is a large cohort of elderly people, who work less – or not at all – and become dependent again. They either live off their own savings or are supported by their families or the state.

The effects of the modern demographic transition can be felt for several generations. An initial spurt of population growth occurs between the beginning of the mortality decline and the end of the fertility decline. But when the baby boom generation itself reaches the

³⁸ Birdsall, Nancy, Allen C. Kelley, and Steven W. Sinding, eds., *Population Matters: Demographic Change, Economic Growth, and Poverty in the Developing World*. Oxford University Press, 2001, p. 13.

³⁹ See, for example, <http://www.popcouncil.org/publications/wp/prd/123.html> for Mark R. Montgomery, Mary Aruends-Kuenning and Cem Mete's paper, "The Quantity-Quality Transition in Asia" (1999), which discusses the dynamics between fertility rates and education in Asia.

prime reproductive years, it creates its own echo: a succeeding baby-boom. Subsequent echo effects produce further spurts. In other words, even if total fertility rates have been reduced to replacement level (2.1 children per woman), the population will continue to grow until the members of the bulge generation and successive echo generations tend to have passed through their prime reproductive years.⁴⁰ This process is called *population momentum*, and its effects will be felt for 70 to 100 years before the population age structure settles down. Due to the effect of population momentum alone, the population of developing countries as a whole is expected to increase by 40 per cent between 1995 and 2100.⁴¹

While population growth has been explored quite fully by economists, far less attention has been paid to changes in the age structure brought about by the demographic transition. Combining the population growth rate and the growth rate of the *economically active* population captures the way that age structures change and delivers striking results.⁴² While population growth has a large and statistically significant *negative* effect on per capita income growth, this effect is counteracted by a statistically significant *positive* effect from growth in the share of the population that is economically active. While the age structure remains constant, therefore, the effect of population growth is neutral, but as the proportion of workers rises or falls, so do opportunities for economic growth. The demographic dividend, for example, was essential to East Asia's extraordinary economic achievements, accounting for as much as one-third of its "economic miracle".⁴³ The "Celtic Tiger" (referring to the rapid economic growth in present-day Ireland) appears to be another powerful illustration of this same

⁴⁰ Assuming constant rates of age-specific fertility, the echo generations will perturb the population pyramid in less and less pronounced fashion, as they are further removed from the initial baby boom.

⁴¹ See John Bongaarts, "Future Population Growth and Policy Options" and David E. Bloom, "Population Growth, Structure, and Policy: Comment", both in Andrew Mason, Thomas Merrick, and R. Paul Shaw, eds., *Population Economics, Demographic Transition, and Development: Research and Policy Implications*, Washington, D.C.: World Bank, 1999.

⁴² The economically active population comprises all persons of either sex who furnish the supply of labour for the production of economic goods and services as defined by the United Nations systems of national accounts and balances during a specified time-reference period. International Labour Office. 1997. *Economically Active Population 1950-2010*. Geneva: International Labour Office.

⁴³ D. E. Bloom and J. G. Williamson, *World Bank Econ. Rev.* 12 (3), 419 (1998[0]). D. E. Bloom, D. Canning, P. N. Malaney, *Popul. Dev. Rev.* 2000, Supplement to Vol. 26, pp. 257-290.

phenomenon. Figure 17 shows how the share of the working-age population has varied over time in different regions of the world. Figure 18 highlights the same fact for East Asia, Sub-Saharan Africa, and Ireland.

However, this *demographic dividend* is not inevitable. It has to be earned. Without the right policy environment, countries will be too slow to adapt to their changing age structure and, at best, will miss an opportunity to secure high growth. At worst, where an increase in the working-age population is not matched by increased job opportunities, they will face costly penalties, such as rising unemployment and perhaps also higher crime rates and political instability. With no policies in place to provide for rising numbers of old people, many will face destitution in their final years.⁴⁴ In addition, the demographic dividend is time-limited. Many developed nations are facing the end of their demographic transition, and now must plan for their aging populations and a decline in their worker-to-dependents ratio. Additionally, some are experiencing shrinking populations. Low fertility rates over an extended period of time, where replacement fertility (2.1 children per woman) is not reached, eventually lead to population decline. Italy's population, currently at 57 million, is projected to decline to 43 million by 2050. Japan's population is expected to decrease from 127 million to 109 million by 2050.⁴⁵ The available labor force will decrease, and the elderly will increasingly make up a larger proportion of the population, bringing with it further social and economic challenges.⁴⁶ Through the lens of demography at least, the next 50 years presents the developed world with significant challenges, at the same time as it offers the developing world a number of appealing opportunities.⁴⁷

44 Bloom, D. and Williamson, J. 1998. 'Demographic transitions and economic miracles in emerging Asia', *World Bank Economic Review* 12, 419–56.

45 United Nations, *World Population Prospects: The 2000 Revision*

46 See Bloom, Nandakumar, and Bhawalkar, 2001, "The Demography of Aging in Japan and the United States", paper presented at the American Academy of Arts and Sciences.

47 See Teitelbaum and Winter. Also, it is worth noting that a declining population, particularly in a country such as Japan, can carry with it the benefit of lessened pressure on natural resources. If the degradation of natural resource capital were accounted for properly, the trajectory of net national income would rise faster (or decline slower) as compared to a stationary or growing population. In addition, putative population decline does not necessarily translate into a comparable decline in the size of the labor force. This is due to the potential for (a) increased labor force participation among women, (b) increased retirement age, and (c)

The Demographic “Dividend”

The demographic dividend is delivered through a number of mechanisms. The most important are labor supply⁴⁸, savings, and human capital.

Labor supply:

The demographic transition affects labor supply in two ways. First, there is an essentially mechanical effect, based on the regular and inevitable aging of the baby boom generation. When this generation is between 15 and 64, it is more likely to be working, thus lowering the ratio of dependents to non-dependents. (Figure 19 shows labor force participation rates by age group.) During the peak working years of 25 to 59, this effect is especially strong. The number of people who would like to work (labor supply) therefore gets bigger, and provided the labor market can absorb the larger numbers of workers, per capita production increases.

Second, women are more likely to enter the workforce, as family size declines.⁴⁹ This effect is magnified by the fact that, with adult women themselves more likely to have been brought up in small families, they are more likely to be educated. This increases their productivity in the labor market, underlining progress towards a stronger workforce and smaller families.

Savings:

increases in net in-migration, which tends to be selective of working-age individuals. For example, the female labor force participation rate in Italy is 33%, while in Japan it is 44%. These contrast with rates of 48% in Canada and 51% in Sweden. Even more telling is the fact that the difference between the male and female labor force participation rate in Italy (23%) and Japan (21%) are higher than for most high-income countries (e.g., the differences for France and the United Kingdom are 12% and 14%, respectively). (World Development Indicators 2001, data for 1999). Finally, retirement ages have been relatively stagnant in comparison with life expectancy. Between 1965 and 2000, Italy's life expectancy increased from 71 to 79, and Japan's from 71 to 81. By comparison, retirement age in Italy is 62 (up from 61 for men and 56 for women during that period) and 65 in Japan. An upward adjustment of the retirement age could mitigate the labor force effects of population aging.

48 See Bloom, Canning, and Sevilla, 2000, “Labor Force Dynamics and Economic Growth,” paper presented at the August 2000 Summer Institute of the National Bureau of Economic Research, Labor Studies Program.

49 See <http://www.ilo.org/public/english/bureau/stat/newsletr/nine.htm>

The demographic transition also encourages the growth of savings, thus improving a country's prospects for investment and growth. Again, there is an accounting and a behavioral effect at work. The young and the old consume more than they generate, unlike working-age people, who tend to have a higher level of economic outputs, and also a higher level of savings.⁵⁰ Further, people tend to save more between the ages of 40 and 65, when they are less likely to be investing in their children and the need to prepare for their retirement is becoming more pressing.⁵¹ So when large numbers of baby boomers start hitting their forties, national savings will tend to rise.⁵² Incentives to make certain choices can reinforce this tendency to save among the new young baby boomers. Improved health, and longevity, make saving easier and more attractive.⁵³ A healthy population must plan far in advance if it is to maintain its standard of living through decades of retirement.⁵⁴ Pensions are made even more important by smaller families and the mobility urbanization brings. An extended family often takes care of its own elderly relatives. A nuclear family, with both parents working, is far less likely to do so, although the latter's increased assets make it better able to provide care financially, if not physically. Additionally, private household savings can provide the capital accumulation

50 Higgins 1998, Higgins and Williamson 1997; Kelley and Schmidt, 1996; Lee, Mason, and Miller, 1998; Leff 1969; Mason 1988; and Webb and Zia 1990

51 Data from household surveys (C.H. Paxson (1996), "Savings and Growth: Evidence from Micro Data," *European Economic Review*, Vol. 40, pp. 255-288; and A. S. Deaton A.S. and C. H. Paxson (1997), "The Effects of Economic and Population Growth on National Savings and Inequality," *Demography*, Vol. 34, pp. 97-114.). A. J. Coale and E. Hoover (1958) suggest that the dip in savings rate for people in their early thirties is related to the consumption needs of people with young families in *Population Growth and Economic Development in Low-Income Countries*, Princeton University Press, Princeton.

52 Studies examining the relationship between age structure and savings include N.D. Leff (1969), "Dependency Rates and Savings Rates," *American Economic Review*, Vol. 59, pp. 886-896; A. Mason (1981), "An Extension of the Life-Cycle Model and its Application to Population Growth and Aggregate Saving," East-West Institute Working Paper No. 4, Honolulu; A. Mason (1987). "National Saving Rates and Population Growth: A New Model and New Evidence," in Johnson D.G. and Lee R. Eds., *Population Growth and Economic Development: Issues and Evidence*, Madison: University of Wisconsin Press 1987; S. Webb and H. Zia (1990), "Lower birth Rates = Higher savings in LDCs," *Finance and Development*, Vol. 27, pp. 12-14; A. C. Kelley, and R. M. Schmidt (1996), "Savings, Dependency and Development," *Journal of Population Economics*, Vol. 9, pp. 365-386; M. Higgins and J. G. Williamson Structure (1997), "Age Dynamics in Asia and Dependence of Foreign Capital," *Population and Development Review*, Vol. 23, pp. 261-293; and D. Bloom, D. Canning, and B. Graham, 2000, "Health, Longevity, and Life Cycle Savings," paper presented to the WHO Commission on Macroeconomics and Health, November 2000.

53 Mason 1998; Meltzer 1995

54 Lee, Mason and Miller, 1998

needed to finance growth, as seen in East Asia.^{55, 56} Further work is needed, however, to take account of the institutional features of pension systems when assessing the importance of the demographic transition to the determination of national savings.

Human capital:

Finally, the demographic transition has significant effects on investments in human capital, effects which are the least tangible, but may be the most significant and far-reaching. The demographic transition begins with changes in mortality that result in a population that lives longer and stays healthier. A longer life expectancy causes fundamental changes in the way that people live. Attitudes to education, family, retirement, the role of women and work all tend to shift. A society, especially if it is taking full advantage of the demographic dividend, is certain to experience deep-rooted changes in its culture, as its people become more valuable assets. Take education, for example: The positive correlation between education and earnings is well known. In Latin America, for example, a worker with 6 years of education earns an average of 50 per cent more than someone who has no formal education. The premium increases to 120 per cent for those with 12 years of education (i.e. finishing secondary school), and exceeds 200 per cent for those with 17 years of education (i.e. completing tertiary education).⁵⁷ As life expectancy increases, parents are likely to choose to educate their children to more advanced levels. Healthier children, in turn, tend to experience greater cognitive development per year of schooling than their less healthy counterparts.⁵⁸ The

55 P. Krugman, "The Myth of Asia's Miracle," *Foreign Affairs*, 1994 Vol.73, pp. 62-78; A. Young, "Lessons from the East Asian NIC's: A Contrarian View," *European Economic Review*, 1994 Vol. 38, pp. 964-973; A. Young, "The Tyranny of Numbers: Confronting the Statistical Realities of the East Asian Growth Experience," *Quarterly Journal of Economics*, 1995 Vol. 110, pp. 641-680; Asian Development Bank, 1997, *Emerging Asia*, Asian Development Bank, Manila, Philippines, esp. Chapter 3 ("Demographic Change and Human Resource Development", pp. 141-197).

56 Higgins, M. 1998. 'Demography, national savings, and international capital flows', *International Economic Review* 39, 343-69. Kelley, A. and Schmidt, R. 1995. 1996. 'Savings, dependency, and development', *Journal of Population Economics* 9, 365-86

57 Inter-American Development Bank, *Facing up to Inequality in Latin America*, Washington DC, IDB, 1999

58 Jamison DT, Wang J, Hill K and Londono J-L (1996): *Income, mortality and fertility in Latin America: country-level performance, 1960-1990*. *Revista de análisis económico*, 11: 219-261

parents also know that there is a good chance that each child will benefit from schooling investments over a long working life and, with fewer children, can devote more time and money to each child. The result of this educational investment is that the labor force as a whole becomes more productive, promoting higher wages and a better standard of living. Women and men therefore tend to enter the workforce later, partly because they are being educated for longer, but they are likely to be more productive once they start working.⁵⁹

All these mechanisms are heavily dependent on the policy environment. A growing number of adults will only be productive if there is sufficient flexibility in the labor market to allow its expansion, and macroeconomic policies that permit and encourage investment. Similarly, people will only save if they have access to adequate saving mechanisms and have confidence in domestic financial markets. Finally, the demographic transition creates conditions where people will tend to invest in their health and education, offering great economic benefits, especially in the modern world's increasingly sophisticated economies. But governments invariably play a vital role in creating an environment where high quality health and education provision is possible – necessary steps to make the most of their country's demographic opportunities.

⁵⁹ ILO, *ibid.* See, also, Bloom, Canning, and Sevilla, *op cit.*

Chapter 3 Case Studies of Population Change and Economic Growth

This chapter examines the interplay between demographic change and economic growth in five specific areas of the world: East Asia, Latin America, Sub-Saharan Africa, the Middle East and North Africa, and Japan. The East Asian nations have experienced the most success in exploiting the “demographic dividend” made available by reduced fertility. Latin America has undergone a less dramatic transition and has had far less success in creating conditions for economic growth. The Middle East and North Africa are still in much earlier stages of the demographic transition, and indeed many parts of Sub-Saharan Africa have seen virtually no decreases in traditionally high fertility rates. Japan, a developed country with an aging population, illustrates the “back end” of the demographic transition: it is facing the issues posed by a declining work force and an increasing ratio of elderly dependents.

East Asia

The East Asian “economic miracle” offers some of the most compelling evidence in recent history of the “demographic dividend”.⁶⁰ The East Asian demographic transition occurred with relative rapidity, over a 50- to 75-year period – the fastest demographic transition to date.⁶¹ Modern transitions are faster because countries gain the benefit of knowledge, experience, or technology developed by others.⁶²

Throughout the world, dramatic improvements in public health emerged from the late 1940s onwards, largely through improved sanitation, safer water, and the development of broad-spectrum antibiotics and antimicrobials (for example, penicillin, sulfa drugs,

⁶⁰ For a detailed and compelling set of analyses on similar topics, see Andrew Mason, ed., *Population Change and Economic Development in East Asia: Challenges Met, Opportunities Seized*, forthcoming 2002, Stanford University Press. Among other topics, Mason addresses the issue of reverse causality, i.e., from economic growth to demographic change.

⁶¹ In Western Europe, for example, the process began in the mid-18th century, and was to last nearly 150 years. In Sweden, the transition took even longer, occupying the better part of 300 years; see also Bloom, Nandakumar, Bhawalkar (2001)

streptomycin, bacitracin, chloroquine, and tetracycline, discovered and introduced between 1920 and 1940, and the use of DDT from 1943). From the 1950s onwards, there were significant and sustained declines in infant and child mortality. The infant mortality rate (the proportion of babies who die before their first birthday) in Asia as a whole dropped from 182 per 1,000 in 1950 to 53 per 1,000 in 2000.⁶³ In time, the effect of the decrease in mortality carried through to a fall in fertility rates. This was assisted by family planning programs, which made birth control both easier and more socially acceptable. In the 1950s East Asia's developing countries used voluntary programs of incentives to encourage families to have fewer children, and the transition from high to replacement level fertility took less than 30 years.⁶⁴ In 1950 the typical East Asian woman had six children – today she has two. In the lag between the decrease in infant mortality and the decline in fertility, a 'baby boom' generation was created.⁶⁵

The East Asian demographic transition was one of the critical factors in the region's spectacular economic growth.⁶⁶ Between 1965 and 1990, per capita income rose annually by over 6 per cent. One explanation for this phenomenal growth is that in the late 1960s, when the baby boom generation started work, their entry into the workforce changed the proportion of workers to dependents in the population. With the benefits of a good education and a liberalized trade environment, this generation was absorbed into the job market and into gainful employment, thereby increasing the region's capacity for economic production. The region's working-age population grew nearly four times faster (an average of 2.4% a year) than its dependent population between 1965 and 1990. A virtuous spiral was thus created, whereby population change increased income growth, and income growth pushed down population growth – and therefore the number of

62 In Ireland, for example, since modern contraception was legalized – first among married couples, and then generally – there has been a steep decline in fertility since the early 1980s.

63 United Nations, *World Population Prospects: The 2000 Revision*.

64 Mason (2001) *ibid*: 31

65 The working-age population rose from around 57% of East Asia's total population in 1965 to around 68% in 2000.

66 See Bloom, David E. and Jeffrey Williamson, "Demographic Transitions and Economic Miracles in Emerging Asia", *World Bank Economic Review*, 1998; Bloom, David, David Canning, and Pia Malaney. (2000). "Demographic Change and Economic Growth in East Asia." *Population and Development Review*.

dependents – by reducing fertility.⁶⁷ East Asia's high savings rates were also affected by the demographic transition, as the baby boom generation entered the workforce and parents had fewer children to take care of, although the extent of the effect is disputed in the literature.⁶⁸ Results from Bloom and Sachs (1998), Bloom and Williamson (1998), and Bloom, Canning, and Malaney (2000) suggest that the demographic dividend accounts for between one-fourth and two-fifths of East Asia's "economic miracle". Growth accounting presented by Mason (2001) further confirms the results of the regression analyses in these works.

Yet as its baby boom cohort ages, East Asia must prepare for an aging population. Not only did infant mortality decrease, but mortality at other ages fell as well and, as a result, life expectancy has risen from around 43 years in 1950 to 72 years today. Population growth has slowed dramatically – from a peak of 2.4 per cent a year in the late 1960s, it is now 0.66 per cent a year, and predicted to be only 0.2 per cent by 2025. When the baby boom retires, the ratio of dependents to workers will change again, and bring added challenges to policy makers and the economy. Japan's dependency ratio, which remained around the 0.45 mark throughout the 1990s, will reach 0.96 by 2050⁶⁹ (see detailed discussion of Japan below). Pensions and health care for the elderly will come under strain and economic growth is likely to shrink as the labor force declines.

An aging population is, fundamentally, a mark of development success. However, the aged face a range of potential problems, including poverty (Japan has elderly poverty rates above 18%⁷⁰). Additionally, the speed of change in the modern world – including profound changes in family and social patterns – means that policymakers worldwide will be hard pressed to ensure that the challenge of an aging society does not become a

67 For discussion of how the spheres of globalization, liberalization, and sustainable human development can be managed to help capture the demographic dividend, see Bloom, Mahal et al (2001) *ibid*

68 See Mason (2001) *ed* for a discussion of the literature on savings rates and the transition.

69 United Nations, *World Population Prospects: The 2000 Revision*

70 Jonathan Gruber, David Wise: *An International Perspective on Policies for an Aging Society*. Working Paper 8103. National Bureau of Economic Research. January 2001

crisis.⁷¹ They will also need to address the fact that a significant proportion of the elderly are women, who often suffer a double disempowerment based on age and gender.

East Asia, with its mix of advanced and developing economies, can expect a variable set of challenges to emerge in the next decade or so. The challenge is already present in some of the richest countries in the region, like Korea and Hong Kong. In the medium term, over the next decade or so, the problem of aging populations will also become more pressing in less wealthy countries such as China.⁷²

Japan

Japan is the world's most rapidly aging country, with life expectancy the highest in the world. A Japanese person born today can expect to live until 81. Whereas in 1920 the median age of a person in Japan was only 27 years, today it stands at over 40 years. Fertility rates are low in Japan – at 1.3 children per woman. The consequences of Japan's rapidly aging population are already being felt, as policymakers strive to prepare for the challenge of an increasingly elderly population. Today, around four people of working age support each pensioner, but in 2025 falling birth rates are expected to halve that figure. In 1950 the figure was 12:1.⁷³

Japan is coming towards the end of its demographic transition, having enjoyed the economic successes of its demographic gift, combined with strong policies. After the Second World War, Japan was in economic crisis. The war had destroyed nearly half of the nation's industrial plants and infrastructure. However, with a series of policies concentrating on building modern factories, and a well-educated and highly literate work force, Japan was able to push its economy to the forefront of technology and modernity, establishing itself as one of the world's most powerful economies.

71 With more women working and a decrease in co-residence of elderly parents with their adult children, the Japanese tradition of family members looking after their elderly is waning. See Bloom, Nandakumar, Bhawalkar (2001) *ibid*: 12

72 The Ageing and Development Report: Poverty, Independence and the World's Older People, 1999, HelpAge International and Earthscan, London

73 United Nations, World Population Prospects: The 2000 Revision

Government/industry cooperation, a well-educated and motivated work force, a focus on technology, and a comparatively small defense allocation (1 per cent of GDP) contributed to Japan's economic success.

But now 17% of Japan's population is 65 years old or over (see Figure 20). In 2050, 42% of the population will be aged 60+, with 15% aged 80+; the dependency ratio will rise from 47% to 96%.⁷⁴ Their care needs (medical, social, and financial) represent a significant challenge. Forty per cent of the 65+ population in Japan live either alone or as a couple. With the breakdown of extended families, the elderly cannot depend on their families to provide for them, and the state must prepare to step into the gap.

Pensions are a particular challenge, given that many countries finance pension payments from current taxation. With a smaller, young workforce supporting a pay-as-you-go pension system, spending on pensions could push Japan's budget deficit up to 20 per cent of GDP by 2030. Pension contributions will have to increase to 35 per cent of salaries to maintain the current level of payouts.

Finally, with the drop in fertility rates, and many people retiring, the number of people working will become smaller, further challenging Japan's economy and slowing growth.⁷⁵ But Japan will not be alone in having to face such challenges in the coming decades. Several of the available reforms proposed by, among others, the Organization for Economic Cooperation and Development⁷⁶, including labor and product reforms and fiscal consolidation, represent good governance strategies irrespective of the aging issue. Nevertheless, the growing proportion of the elderly will no doubt exert significant additional pressure on policymakers.

74 UN, World Population Prospects: The 2000 Revision.

75 Japan's labor force will fall by 13% between now and 2050, and income growth will slow to 0.25% by 2040. (Dave Turner, Claude Giorno, Alain de Serres, Ann Vourc'h and Pete Richardson: The Macroeconomic Implications of Ageing in a Global Context. OECD Working Paper 1998 AWP 1.2.)

76 For an accessible overview see, for example, The Economic Impacts of Ageing, Nicholas Vanston, The OECD Observer No. 212, June/July 1998

OECD, North America and Western Europe⁷⁷

The developed world has reached an advanced stage of the demographic transition. Fertility rates are below replacement level, and populations are growing at a slow pace. North America continues to grow largely because of its high rates of net migration and large population of childbearing age, while Western Europe's population has plateaued and will begin a slight decline in a few decades. From 2001 to 2025, the population of Europe as a whole is expected to decline by 6%, that of Japan by 3%, and North America's will grow by 21%. Sub-Saharan Africa, on the other hand, is projected to grow by 74%.⁷⁸

The demographic transition in the developed world began in the 19th century. Infant mortality in England and Wales declined from 154 deaths per 1000 live births in 1861 to 21 deaths 100 years later. Life expectancy also rose over the same period, with male life expectancy rising from 40 to 68. Fertility also fell, in most countries by about 50% between 1870 and 1940.⁷⁹ During the late 19th and early 20th century, the working-age population began to grow more quickly than the young dependent population, potentially contributing to the acceleration of economic development that occurred in the West in this period.⁸⁰ After World War II, however, increased optimism about the future saw fertility rates in the West shoot up. From a low of 2.2 children per woman in the 1930s, US fertility rates rose to a high of 3.8 in 1957. The pattern in the United Kingdom, Australia, Canada and New Zealand was similarly dramatic.⁸¹ Fertility rates only began to fall again in 1960, declining sharply and reaching replacement levels in the mid-1970s. Other Western European countries also experienced fertility rises after World War II, although on a smaller scale. The famous "baby boom" generation was thus created. Some research

77 OECD includes Australia, Austria, Belgium, Canada, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Italy, Japan, Korea, Luxembourg, Mexico, The Netherlands, New Zealand, Norway, Poland, Portugal, Slovak Republic, Spain, Sweden, Switzerland, Turkey, United Kingdom, United States.

78 UN, World Population Prospects: The 2000 Revision.

79 Michael S Teitelbaum, Jay M Winter (1985): The Fear of Population Decline. Academic Press, Inc. London: 14

80 Malmberg and Lindh (2000).

81 Teitelbaum (1985) *ibid*: 69

finds that these post-World War II demographic changes had a significant effect on growth. Population growth among middle-aged adults promotes income growth, population growth among the old-aged tends to slow growth, while population growth among young adults seems to make no contribution.⁸²

Caplow, Hicks, Wattenberg (2001) note that fertility in the wealthy industrial countries has continued to fall, and is likely to remain below the replacement level of 2.1 births per woman well into the 21st century. The baby boom generation is now approaching retirement age, and the continued decline in fertility rates has meant that the West now faces the problem of an aging society, where an increased cohort of elderly relies on a reduced working-age population. The UN Population Division has forecast that the percentage of people aged 60 or over in the developed regions will rise from 19% in 2000 to 33% by 2050.⁸³ Furthermore, the dependency balance has shifted. In 1950, children made up 27% of the population in these regions and people aged 60 or over 12%. By 2050, however, this situation will be reversed, with the proportion of older people rising to 33% and that of children falling to 16%.

Population aging is most advanced in Europe and Japan. The median age of Europeans is expected to rise from 38 in 2000 to 49 in 2050, and the median age in Japan is already 41.⁸⁴ So, whereas South-central Asia and Sub-Saharan Africa's policymakers should be looking at ways to capture a future demographic dividend, the governments of the developed world, whose dividend is about to expire, are likely to find coping with an aging population high up their list of priorities. Aging populations will put pressure on social security systems, health services and pensions, as the smaller working-age group contributes fewer taxes and the economy, potentially, shrinks.

The United States' welcoming of immigrants, which will ensure that the working-age population continues to grow, is in marked contrast to Japan's policy, where immigrants

⁸² Lindh and Malmberg (1999a) and Malmberg (1994).

⁸³ United Nations, World Population Prospects: The 2000 Revision.

⁸⁴ United Nations, World Population Prospects: The 2000 Revision.

make up just 1.2% of the population. Western Europe is more open than Japan, although current policies will see its population shrink slightly and age over the next 50 years.

Public sector reform will focus on health care, pensions and social security. Private health care and pensions are likely to become more important along with public/private partnerships in health care provision,⁸⁵ and raising the retirement age and encouraging people to work into retirement via tax breaks and lifelong training have also been mooted.⁸⁶

Some have even predicted great difficulties for the West as a result of the aging boom,⁸⁷ but changing habits, whereby people turn to private health care and pensions, retire later and do more work for longer are likely to soften the blow. Changing immigration patterns will also play a part in averting economic collapse.⁸⁸ The private sector is likely to have a vital role to play both in provision of public services and attracting immigration. Engaging private enterprise will require a change in attitudes, particularly in those Western European countries used to overbearing public sector bureaucracies, so change is likely to be slow. Policymakers will have to focus on facilitating these changes, and prompt action now will ease the pain later.

85 Victor Fuchs (1999): Health care for the elderly: How much? Who will pay for it? Health Affairs, Vol 18, Number 1, 1999; Bloom et al (2001) *ibid*

86 Wattenberg (1987) *ibid*: 68, Bloom et al (2001) *ibid*

87 Peter G. Peterson, *Gray Dawn: How the Coming Age Wave Will Transform America – And the World*. Times Books. 2000. On the other hand, Weil (1999) argues that trying to reverse this process may entail its own large transitory costs.

⁸⁸ See Section 2.3 of Weil (1997) on the effects that immigration can have on slowing growth in the dependency ratio.

South-central and Southeast Asia⁸⁹

South and Southeast Asia have lagged behind East Asia in the demographic transition. However, Southeast Asia has recently begun to benefit from the demographic dividend, and South-central Asia is likely to follow.⁹⁰

Until 1950, population growth rates across Asia had remained relatively stable at less than 1% per year for at least the previous 70 years. However, from 1950 to 1990, rates in South-central and Southeast Asia shot up, averaging well over 2% per year. These rates were lower than in Africa, but similar to Latin America and well ahead of East Asia, North America and Europe. This growth can firstly be attributed to falling mortality rates. The introduction of drugs to treat diseases such as tuberculosis, scarlet fever and pneumonia, coupled with the use of anti-malaria drug DDT, saw infant mortality rates in particular decline dramatically. As in East Asia, fertility declines followed the fall in mortality. Health improvements have meant that families have needed fewer children in order to ensure desired family sizes. Family planning programs have also had an impact. The fall in Southeast Asia's fertility rate has been nearly as dramatic as that of East Asia, while South-central Asia's average number of births per woman has been nearly halved since 1960. Southeast Asia's rate is expected to come close to East Asia's rate by 2020. This will eventually lead to a decline in growth rates to around 1% by a few by approximately 2020.^{91,92}

As well as the size of the region's population, therefore, its structure has also changed. As shown in Table 3, although South-central and Southeast Asia's economically active population grew in comparison with their economically dependent population from 1965-

89 It is often difficult to compare results across studies because the geographical definitions of different regions vary from one source to another. For example, many of the demographic facts cited here are based on UN data and regional groupings, whereas some of the economic analysis is based on a somewhat different set of regional groupings used by the Asian Development Bank. The demographic data reflect the following UN definitions: South-central Asia consists of Afghanistan, Bangladesh, Bhutan, India, Iran, Kazakhstan, Kyrgyzstan, Maldives, Nepal, Pakistan, Sri Lanka, Tajikistan, Turkmenistan, and Uzbekistan. South-eastern Asia consists of Brunei Darussalam, Cambodia, East Timor, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand, and Vietnam.

90 Asian Development Bank (1997): *Emerging Asia: Changes and Challenges*. ADB: 142

91 ADB (1997) *ibid*: 150

1990, the difference was much less marked than that in East Asia (Table 4 gives the analogous figures for all regions of the world through 2015). As a consequence, the demographic dividend has so far been less pronounced. While East Asia's working population made up over 65% of the total population in 1990, Southeast and South-central Asia's was less than 60%. Moreover, the ratio in East Asia rose sharply in the 15 years from 1975, while in the rest of Asia it rose more steadily. By 2025, Southeast Asia will match, and South-central Asia will nearly match, the figure for East Asia. Consistent with this, dependency ratios have fallen more slowly in Southeast and South-central Asia, with the latter's youth dependency ratios in particular (the percentage of under 15 year olds compared to the working age population) experiencing only modest declines.

While Southeast Asia has already gained considerable economic benefit from its demographic change (which accounts for about 1% of per capita annual income growth) and is likely to see this benefit reduced over the next 25 years as the population ages, South-central Asia's transition is still continuing, suggesting growing potential for economic growth. More specifically, the current demographic dividend of approximately 0.7% of per capita annual income growth could well double as the boom reaches its peak.⁹³

In order to fully capitalize on the demographic dividend, however, South-central Asia will do well to follow the policy initiatives employed so successfully by East Asia. Fertility in the region is still high at around 3.2 births per woman in 2000 (the rates in Southeast Asia and East Asia are 2.5 and 1.8 respectively⁹⁴). Family planning programs will help to push fertility rates down, and will have the corollary effect of limiting the spread of HIV/AIDS. As the Asian Development Bank has shown, there is a large unmet demand for contraception across South and Southeast Asia and eliminating all unwanted births would go a long way towards reducing fertility to replacement levels.

92 United Nations, *World Population Prospects: The 2000 Revision*.

93 ADB (1997) *ibid*: 158-9

94 UN, *World Population Prospects: The 2000 Revision*

Education and training are other key areas that determine the success of a country's efforts to capture a demographic dividend. Although primary and secondary enrollment levels in Asia have risen dramatically in recent decades, the demand for quality tertiary education is as yet largely unmet. The emerging global economy places increasing emphasis on higher education. Many countries in the region may not be able to take full advantage of their favorable demographic indicators because of relatively low rates of tertiary enrollment. New approaches to funding and a new focus on high-value areas such as technology and tourism will be required if the region is to catch up with the likes of North America.⁹⁵ India, with its burgeoning information technology sector, has already seen, via job creation, remittances, and FDI, the benefits of investment in quality higher education and a focus on core new economy subjects.⁹⁶

The new economy will also require a focus on lifelong training. As a country's economy moves up the value chain, workers will need to be re-trained to cope with the demands of a flexible labor market. This should be combined with labor market flexibility. If the South-central Asian labor market cannot cope with the huge influx of workers produced by the demographic shift, a potential virtuous spiral, with a bigger labor force contributing to increased productivity and higher savings rates, could be reversed, with rising unemployment levels leading to crime, poverty and civil disorder.

As in East Asia and the West, policy will also need to look to the long-term, when the boom generation retires. Health care systems and pensions will come under pressure, and the private sector may be usefully harnessed to help drive reform efforts.

The importance of policy to the success of attempts to capture the demographic dividend was demonstrated in East Asia. Southeast Asia, whose transition is fairly well advanced, and South-central Asia, whose potential boom is yet to come, cannot assume that demography alone will guarantee economic growth. Many governments in these regions

⁹⁵ For a fuller discussion of the importance of higher education and approaches to reforming it, see World Bank/UNESCO Task Force on Higher Education and Society (2000): Higher Education in Developing Countries: Peril and Promise. March 2001

have made a good start in certain key areas – Bangladesh has had great success with family planning programs, for example, India with basic and secondary education and the technology sector, Thailand with health efforts which have limited the spread of AIDS, and many of the countries of Southeast Asia in liberalizing labor markets and attracting foreign investment. However, there is more work to be done, and, with the demographic shift advancing, the quicker it is done the better. Fertility levels are still high, tertiary education is weak and exports are underdeveloped. The potential is there for the rest of Asia to do as well as East Asia, and the region's success will depend on its policymakers.

Latin America

Latin America's population growth is following a similar pattern to East Asia's. In 1965 life expectancy in Latin America and East Asia was in the upper 50s. Following similar improvements in public health, Latin America's life expectancy now stands at 70 years, slightly behind East Asia's 72. There have also been significant reductions in infant mortality in Latin America, which decreased from 91 deaths per 1,000 live births in 1965 to 32 in 2000: a figure very similar to East Asia's 34. The fertility rate has also fallen – from around 5 children per woman in 1975 to the present 2.5. In some countries in the region, such as Brazil, Chile, and Uruguay, the fertility rate is just above replacement levels (2.1 children per woman).⁹⁷ Barbados, Cuba, and Trinidad and Tobago are far below this level. Other countries, however, have much higher rates. In Bolivia, Guatemala, Haiti, Nicaragua, and Paraguay, women are having approximately 4 children.⁹⁸ It may be significant that income disparities in the region are also the widest for any region in the world (although Sub-Saharan Africa runs a close second).

Although Latin American demographic changes have been favorable for growth since 1970, economic growth has yet to follow the East Asian example. So while East Asia

⁹⁶ David E. Bloom and Henry Rosovsky, "Higher education and international development," *Current Science*, Vol 81, No 3, August 10, 2001, 252-256.

⁹⁷ Reducing the number of young family members in Brazil has had a significant negative impact on poverty in that country. See Ricardo Paes de Barros, Sergio Firpo, Roberta Guedes Barreto, and Phillippe George Pereira Leite, "Demographic Changes and Poverty in Brazil," in Birdsall, Kelley, and Sinding, op cit.

shows a per capita annual growth rate between 1975 and 1995 of 6.8 per cent, the growth rate for Latin America over the same period is one-eighth of that, at 0.7 per cent. Although there has been much debate surrounding Latin America's failure to thrive, there appears to be a growing consensus that the heart of the matter concerns policy.⁹⁹ Military juntas and dictators ruled much of Latin America for most of the 20th century, until the late 1970s. Between 1978 and 1990, 15 Latin American countries abandoned such regimes and took tentative steps towards democracy.

Economic changes in the region were also dramatic, with a growing adoption of the Washington Consensus in the late 1980s and 1990s.¹⁰⁰ Between 1965 and 1990, Latin America was largely closed off from the world economy. By 1980, only 12 per cent of the region counted as being open. Cross-country regression analysis suggests that a country with a working-age population growing 3 percent per year, and 1.5 percent faster than its overall population, will see its growth boosted by 0.5 per cent a year if its economy is closed, but by 1.5 percent a year if its economy is open.¹⁰¹ In other words, a policy of openness can triple the size of the demographic dividend the country collects. A retrospective analysis suggests that had the region been completely open between 1965

98 United Nations, *World Population Prospects: The 2000 Revision*.

99 Inter-American Development Bank, *Development Beyond Economics*, IDB 2000 report, Washington DC, 2000.

100 John Williamson, the inventor of the term "Washington consensus", has made it clear that he believes the term has two quite different meanings. First, there is the meaning he gave the term, which involved consensus around a set of ten policy reforms which he believed were widely accepted as beneficial by economists. In the original formulation, these were: fiscal discipline; a redirection of public expenditure priorities toward fields offering both high economic returns and the potential to improve income distribution, such as primary health care, primary education, and infrastructure; tax reform (to lower marginal rates and broaden the tax base); interest rate liberalization; a competitive exchange rate; trade liberalization; liberalization of Foreign Direct Investment (FDI) inflows; privatization; deregulation (in the sense of abolishing barriers to entry and exit); and secure property rights. Then there is the meaning the term has acquired: "market fundamentalism or neo-liberalism: laissez-faire, Reaganomics, let's bash the state, the markets will resolve everything." We use the term in the latter, now more common, usage. (What Should The Bank Think About The Washington Consensus? John Williamson, background paper for the World Bank's World Development Report 2000, July 1999.

101 David E. Bloom, David Canning, David K. Evans, Bryan S. Graham, Patrick Lynch, and Erin E. Murphy. *Population Change and Human Development in Latin America*. Background paper for IPES 2000. Harvard Institute for International Development, 1999. See also, David E. Bloom and David Canning, "Cumulative Causality, Economic Growth, and the Demographic Transition," in Nancy Birdsall, Allen C. Kelley, and Steven

and 1985, Latin America's growth would have averaged 0.9 percentage points, per annum, higher. This would have doubled growth for each year, on average, during that period.¹⁰²

A combination of weak governance and a lack of openness to trade appears to have slowed the potential growth that demographic changes might have brought to Latin America. This interaction is important. Analysis shows that the direct effect of changing age structure accounts for only 11 per cent, or 0.6 percentage points, of the growth gap between Latin America and the fastest-growing East Asian economies. However, when the interactive effect of policy and demography are also accounted for, some 50 per cent of the gap is accounted for.¹⁰³ In other words, countries in East Asia pursued a range of policies (especially trade policies that created substantial numbers of new jobs) that allowed them to take much fuller advantage of their demographic dividend. Latin America has yet to take such advantage of its population dynamics.

So while the demographic transition produces favorable conditions, it does not guarantee that an increased supply of workers will be gainfully employed. Nor does it ensure that those who wish to save will find themselves encouraged to do so. Neither can it provide institutions to press home health advantages or to create the educated population vital to a high-value society. Latin America began its transition, but was over-reliant on domestic demand and did not export vigorously. Many of its governments were corrupt, and repeated financial disasters had the effect of making saving ill-advised.¹⁰⁴

There are signs of hope, however. Between 1990 and 1995, approximately 70 per cent of the region opened up to the world economy, reflecting substantial policy reform. And it could have been worse, of course. With even more unsuitable policies, the baby-boomers could have become a heavy burden, rather than a help, as the unemployed acted as a

Sinding, *Population Matters: Demographic Change, Economic Growth and Poverty in the Developing World*, pp. 165-197. Oxford 2001: New York.

¹⁰² Measured in 1985 purchasing power parity international dollars. See R. Summers and A. Heston *The Penn World Tables (Mark 5); An Expanded Set of International Comparisons, 1950 –1988*. *Quarterly Journal of Economics*, 1991 106: 327-68

¹⁰³ Bloom et al 1999

drag on the economy and damaged the fabric of society. The opportunity to benefit from a dividend is not yet lost. Mortality and fertility rates are still in decline, so Latin America can still benefit – but only if its policymakers act decisively and appropriately.

Middle East and North Africa

Most Middle East and North African (MENA) countries are at relatively early stages of their demographic transitions, having achieved relatively high life expectancy. Across the region life expectancy is 65 years, the world average. Fertility rates, however, remain relatively high, and as a region are second only to Sub-Saharan Africa, with an average of over four children per woman. In 1997 in Jordan, for example, the average woman would have 5 babies; while in Egypt she would have 3 or 4 and in Yemen 7 or 8.¹⁰⁵

The region has also seen healthy economic growth over the last two decades, and some of this is due to the growth in the working-age population. In Egypt, the demographic transition through 1990 is estimated to have accounted for one-sixth of the growth of Egypt's income per capita between 1965 and 1990.¹⁰⁶ Jordan's transition started earlier, and the country will see dependency ratios falling from 1.0 in 1990 to around 0.48 in 2040. This has been estimated to account for nearly half of Jordan's future predicted per capita growth rate.¹⁰⁷

However, if fertility rates do not fall, the ratio of workers to dependents will not change dramatically, and the region will see population growth without the opportunity for dramatic economic growth. Models show that the effect of fertility rates on the annual growth rate of GDP per capita is substantial – in Syria, for example, economic growth could be raised significantly if the ratio of working-age to total population was changed

104 Latin America ranks worse than any other region except Africa on corruption indices (IDB 2000)

105 Population Council (2001): In Egypt and Morocco, delayed childbirth contributes to lower fertility. News release 14 March.

106 From Demographic Lift to Economic Lift-off: The Case of Egypt, David E. Bloom and David Canning, Conference Paper for Growth Beyond Stabilization: Prospects for Egypt, February 3-4, 1999.

107 David E. Bloom, David Canning, Kinga Huzarski, David Levy, A. K. Nandakumar, and Jaypee Sevilla: Demographic Transition and Economic Opportunity: The Case of Jordan. July 2000

through a low fertility rate: analysis suggests an effect as great as 1.62 percentage points on the annual growth rate of GDP per capita.¹⁰⁸

Policy will be a significant factor in determining whether MENA countries are to enjoy the demographic dividend. Openness to global trade, as well as policies to support employment and education, can help countries to absorb the baby boom generation of workers into productive and remunerative employment. Saudi Arabia, for example, is currently facing the prospect of mass unemployment among graduates and school-leavers. Sixty per cent of the current population is under 25. Some analysts blame foreign investment trickling out of Saudi Arabia, alongside an outdated education system, which has not equipped Saudi nationals for work in a global economy. Among other factors, some blame Saudi labor laws, which discourage private companies from employing Saudis because it is extremely difficult to dismiss a Saudi national who is not doing his job.

People are naturally enterprising, provided their opportunities to work are not stifled by bureaucracy, uncompetitive environments, lack of available capital for investment, or an absence of skills. The region needs to work towards more liberal labor markets, while also investing in education and training to ensure wider access to opportunities. It will also need to encourage foreign and internal investment. If it can achieve these changes, combined with decreasing fertility, then the Middle East and North Africa could benefit from its dividend; if it doesn't it will increasingly face the problems that Saudi Arabia is struggling to resolve today.

Sub-Saharan Africa

This region has yet to experience the typical demographic transition. While mortality has declined, following the pattern in other areas (infant mortality fell by 43% from 1960 to 2000), fertility has not (declining only 19% in the same period). Rather than a baby boom

¹⁰⁸ The Demographic Transition and Economic Growth in the Middle East and North Africa, David E. Bloom and David Canning, Conference Paper for the Fourth Annual Conference of the Middle East Institute and the World Bank, April 14, 1999.

– where the number of births rises for a period before falling as fertility declines – this has resulted in an unprecedented population explosion, with the 1950 population expected to have quadrupled to 718 million by 2004. Dependency ratios have, unlike in all other regions of the world, correspondingly risen. Whereas most areas' working-age (15-64 year old) population makes up 60% to 70% of the total, only 53% of Sub-Saharan Africa's people are in this age group. The baby boom has seen the working-age population in most areas grow 0.35% per year faster than the total population, but in Sub-Saharan Africa it has grown at a similar rate to the total.¹⁰⁹ With AIDS now killing off large sections of that working population and actually bringing average age down in many countries, the region has had no demographic dividend to reap.¹¹⁰

Although demographers tend to agree that Sub-Saharan Africa will experience a fertility transition, there remain disputes concerning its timing, the reasons underpinning continued high fertility rates, and what the best interventions might be. As Bloom and Sachs have noted, "Africa's demographic uniqueness [over the past half century]...is *not* in the *level* of fertility but in the *persistence* of such a high level of fertility in the face of mortality declines."¹¹¹ High fertility has been the major component of its sluggish demographic transition and a major cause of its massive population growth. Compared with other developing regions in 1960, Sub-Saharan Africa started with a slightly higher total fertility rate of 6.7 children per woman. By the mid-1990s, dramatic reductions had occurred elsewhere – to 3.0 children per woman in Latin America, 3.8 in South-central Asia, and 2.2 in East Asia. During that period, all three regions saw a surge in contraception use: the percentage of married women aged 15-49 using contraception rose from around 13 percent to 80 percent in East Asia, from 7 to 40 percent in South Asia, and from 14 to 67 percent in Latin America. The figures for Africa over that time period are much less dramatic, rising from around 5 percent to just 18 percent, with

109 David E Bloom, Jeffrey D Sachs: Geography, Demography and Economic Growth in Africa. Harvard Institute for International Development. October 1998: 24

¹¹⁰ In addition to its negative effect on workforce growth, adult AIDS mortality also has a negative effect on numbers of births. Although these effects operate in different directions with respect to the dependency ratio, our calculations indicate that the former effect outweighs the latter. See below, in this section's discussion of AIDS mortality data from Thailand.

fertility remaining at 5.7 children per woman.¹¹² While some countries, in particular those of Southern Africa (Namibia, Botswana, South Africa and Zimbabwe) and Kenya, have achieved this rate, and are seeing the beginnings of a transition, the majority of Sub-Saharan African countries have yet to reach this threshold, and face a much longer road to declining fertility rates.¹¹³

There are various reasons for this continued high fertility. With limited financial infrastructure in rural areas offering little incentive or means to save, children are still viewed as insurance against old age. They are also a key source of labor. Furthermore, and despite medical advances, infectious disease is still widespread, particularly in rural areas, so cultural norms and policies encouraging high fertility in order to achieve desired family sizes (such as child fosterage, polygyny and the distribution of land according to family size) are changing only slowly.

Africa is a continent of extremes, and in the last 30 years, it has faced a series of prolonged and debilitating wars. Wars not only kill and injure soldiers and civilians alike; they also destroy infrastructure and social structures, which in turn has a negative impact on a population's health. Life expectancy in Mozambique, for example, is now down to 38 years. There is an argument, however, that the relationship between war and health runs two ways, creating a vicious spiral: because a shorter life expectancy can lead to different perceptions of risk, it contributes to the belligerence of a population, and thus greater willingness to engage in war.

Another aspect of the problems facing Sub-Saharan Africa is the virulence of infectious diseases. Despite some impressive health gains over the last century, malaria, HIV/AIDS, and TB are just three of the big killers that are not yet successfully controlled. Malaria and HIV alone currently account for 3-4 million of Sub-Saharan Africa's roughly 10 million

111 Bloom, Sachs (1998) *ibid*: 25

112 Population and Reproductive Health in Sub-Saharan Africa, Thomas J. Goliber, 1997. Population Reference Bureau, Washington DC.

113 As Bloom and Sachs have said, "The youthful structure of Africa's population pyramid and the sluggishness of its transition to lower fertility rates indicate that African economies will be burdened by rapid population growth for several decades." (Bloom, Sachs (1998) *ibid*: 4)

annual deaths. HIV is particularly virulent in Sub-Saharan Africa, where many countries have ten or more people living with HIV for each person who has already died from the disease. Between 1985 and 1995, more than 4 million Sub-Saharan Africans died of AIDS. Fifteen million more deaths are expected by 2005, with 70% of the world's new infections and 80% of AIDS deaths occurring in Sub-Saharan Africa alone. In December 1999, UNAIDS reported that 8.8% of adults in Sub-Saharan Africa were HIV positive. The UN estimates that life expectancy today in Sub-Saharan Africa is 7 years lower than it would be in the absence of AIDS. As a result of HIV/AIDS, the population of the 35 Sub-Saharan African countries most affected will be 10% lower in 2015 than it otherwise would have been, and this despite continuing high fertility in the region.¹¹⁴ The outcome of this is hard to predict, but the ratio of working young adults to dependents will certainly continue to dwindle.

Furthermore, in addition to children and the elderly as dependents, many will be suffering the ravages of HIV disease in adulthood. Heterosexual sex is the dominant means of transmission, and the majority of people dying of AIDS are between 20 and 59 years of age. In other words, it is a disease that particularly hits those who should be economically productive – and threatens not only health, but also the economic stability and potential of a country.¹¹⁵

Data are far from adequate, but calculations made for Thailand may be instructive for understanding the potential economic effect of AIDS in Sub-Saharan Africa. Thailand's ratio of working-age to total population is projected to be 0.70 in 2015.¹¹⁶ We estimate that cumulative AIDS deaths by that year will be about 1 million, a relatively small number because risky behaviors have declined as a result of Thailand's highly successful anti-HIV policies. Yet if we simulate cumulative AIDS deaths in the absence of these substantial

114 UN Population Division (2001): World Population Prospects – The 2000 Revision Highlights. New York 28 February. DRAFT

115 David E. Bloom, Lakshmi Reddy Bloom, and River Path Associates (2000): Business, AIDS and Africa. The Africa Competitiveness Report 2000-2001. World Economic Forum, Harvard Center for International Development. Oxford University Press. David E. Bloom, Ajay Mahal, Jaypee Sevilla, and River Path Associates, "AIDS and Economics," paper prepared for Working Group 1 of the WHO Commission on Macroeconomics & Health. 2001.

behavioral improvements, they could be as high as 10 million. Add to this an estimate of the number of children that would not have been born because of these deaths and the population could be about 11.6 million smaller than it otherwise would have been. AIDS mortality is disproportionately selective of adults, and we project that of the 10 million deaths, 92% or 9.2 million would be among adults. To this number, we add the .75 million children these adults would have had, and who would have had the chance to reach working age by 2015, and we find that this high risk scenario causes the working age population to be smaller by about 9.95 million.¹¹⁷ This combined effect on the total and working age population would result in a decline in the working-age share of the population to 0.67. This difference could reduce the growth in per capita GDP by about .65 percentage points every year from a projected rate of 3.46 to 2.81. As a result, the level of GDP per capita in 2015 would be \$1272 lower than its projected \$8500. At Thailand's current prevalence rates, still among the highest outside Africa at an adult rate of 2.15 percent, the impact on GDP is minimal. Nevertheless, the example demonstrates that an unchecked AIDS epidemic – as some African countries are experiencing – can have a substantial effect on the growth of income per capita because it is so highly concentrated in working-age individuals.

Ill health undermines a nation at every level, and precipitates and contributes to a vicious downward development spiral. Poverty increases susceptibility to illness, itself a prime cause of poverty. High mortality and fertility rates discourage investment in human capital: a family cannot afford to spend its limited resources on only one or two children,

¹¹⁶ United Nations, World Population Prospects: The 2000 Revision

¹¹⁷ Given an estimated cumulative number of females dead in 2015, we estimate the number of children these females would have had by assuming that over the 25 year period from 1990 to 2015 over which we are performing the projections, each female who dies from AIDS loses an average of 12.5 years of child-bearing life (the midpoint of the 25-year interval). We divide the 1995 Thai total fertility rate of 1.94 (UNPOP 2000) by 35, the number of child-bearing years (from 15 to 50 years of age), to obtain the average number of children born to a woman each year, about .06. We multiply this by 12.5, the number of child-bearing years lost to AIDS, to obtain the number of children lost to an AIDS death, about .75. We then calculate the total number of children lost by multiplying this number by the cumulative number of female deaths. Given this total number of children who were not born because of AIDS deaths, we (again roughly) compute the fraction of these children who would have reached working age by the year 2015 by simply assuming that the same number of children would have been born every year, and that those born by 2000 would reach working age by the year 2015.]

because their survival rate is relatively low. The reduced incentive to invest in the future threatens the economy as well as the political stability of a nation. The UN Security Council recently acknowledged the seriousness of the situation when the impact of AIDS on Africa's peace and security made the agenda on 10 January, 2000: the first time in over 4,000 debates that they had tabled a health issue. UN Secretary-General Kofi Annan has also given the issue prominence, reporting in his millennium statement that "the pandemic is destroying the economic and social fabric in the countries most affected, reversing years of declining death rates and causing dramatic rises in mortality among young adults."¹¹⁸

As long as fertility remains high and families have large numbers of children, Sub-Saharan African countries are unlikely to see rising incomes or healthier and better-educated workers. Poverty, low educational attainment, and poor health outcomes across much of Sub-Saharan Africa will slow fertility decline. Despite these problems, fertility is expected to fall from 5.5 to 3.5 in the next 25 years.¹¹⁹ Still, a potential virtuous spiral has inverted and there are no simple solutions for dramatically speeding a rise in incomes. There are opportunities to tackle this, however, and perhaps the most promising is that of gender: if policy makers can urgently place much more emphasis on educating and empowering African women, who represent one of the continent's most important economic and social engines, they can expect their countries to yield corollary rewards.

One other possible trend deserves mention: that of substantially increased migration from Sub-Saharan Africa to Europe, discussed in some detail in Hatton and Williamson (2001)¹²⁰ Two forces are working together to impel such migration: (a) wage rates are much higher in Europe than Sub-Saharan Africa; and (b) the two regions are at totally different, but complementary points in the demographic transition: specifically, Sub-Saharan Africa has a huge percentage of young people and Europe has a high proportion of working-age individuals. The ratio of working-age to non-working-age individuals is

¹¹⁸ UN (2000): Report of the Secretary-General on the Work of the Organization. New York 2000: 28

¹¹⁹ United Nations, World Population Prospects: The 2000 Revision.

reasonably constant over time when the total population of Europe and Africa are combined. By contrast, this ratio trends upward in Africa for many decades to come, but downward in Europe after 2010. This pattern suggests, at first, that migration of workers from Sub-Saharan Africa to Europe could be beneficial for the economies of both regions. In practice, of course, European restrictions on immigration are likely to hold down the number of Africans who succeed in emigrating to Europe. Moreover, even if 1 million Sub-Saharan working-age immigrants moved to Europe each year from 2000 through 2024 (which would be on the order of a ten-fold increase over current levels¹²¹), the ratio of working-age to non-working-age people in Europe would decrease only a bit more slowly than it would otherwise, with the ratio falling from 2.02 in 1995 to 1.97 in 2025 instead of to 1.85.¹²² Of course, such a scenario would have enormous cultural, economic, and political effects in Sub-Saharan Africa.

Eastern Europe and the former Soviet Union

Patterns of fertility Eastern Europe have historically been very different from those in the West. Fertility rates fell throughout the 20th century, with only a slight increase after World War II, quickly followed by further declines after abortion was legalized in the 1950s (seven out of every ten Russian pregnancies end in abortion, although increased contraceptive use has recently begun to push abortion rates down).¹²³ The fertility rate in Russia has fallen from 7 children per woman to just 1 in the last 100 years.¹²⁴ Latvia, Bulgaria, Ukraine, Slovenia, the Russian Federation and Czech Republic all currently figure in the ten lowest-fertility countries in the world, with rates well below replacement

120 Hatton, Timothy J., and Jeffrey G. Williamson, "Demographic and Economic Pressure on Emigration Out of Africa," NBER Working Paper No. W8124, February 2001.

¹²¹ Current data are difficult to find, but the Netherlands Interdisciplinary Demographic Institute states that "Annual migration from Sub-Saharan Africa increased dramatically, from 15 thousand people in 1985 to 82 thousand in 1993." See <http://www.nidi.nl/research/prj30201.html>

¹²² In the interest of simplicity, this calculation assumes that African immigrants all remain in the working ages through 2025 and that they do not bear children in Europe. Undoing either of these assumptions suggests that the age distribution benefits of African migration to Europe would be even less.

123 Teitelbaum et al (1985) *ibid*: 103

124 Zakharov, Sergei V, and Elena I Ivanovna (1996): Fertility decline and recent changes in Russia: On the threshold of the second demographic transition. In Julie DaVanzo ed, *Russia's Demographic Crisis*. Santa

levels.¹²⁵ The ten countries with lowest population growth rates are all found in this region, with Estonia, Georgia, Bulgaria and Ukraine seeming likely to remain at very low rates for at least the next two decades.

Rising death rates have sped up the population decline. A high dependence on alcohol has contributed to a steep rise in cardiovascular diseases, circulatory problems and violence, and the death rate among Russian males in particular has soared. Furthermore, health systems in the region have deteriorated, leading to the spread of both old infectious diseases like tuberculosis, and new ones like HIV/AIDS. Reported HIV infection rates in Eastern Europe and the former Soviet Union rose by 67% between the end of 1999 and the end of 2000, with the number of new infections in the Russian Federation in 2000 alone almost double the total number reported in the previous 12 years.¹²⁶

Fertility rates in the region are likely to begin to rise again by 2025, but total population sizes will continue to fall for the next 50 years. Russia's population will fall from 145 million today to 104 million in 2050, for example, and Ukraine's will drop from 50 million to 30 million over the same period. The continuous decline in fertility and the rise in death rates have meant that Eastern Europe, and Russia in particular, have experienced very different demographic changes from those of other world regions. In the next 50 years Russia will see a growth in its elderly population and a shrinkage in its working-age and youth population. Although countries such as Japan will see the same pattern, they have had the benefit of a baby boom generation helping to boost the economy and make it better able to cope with an increased elderly cohort. The former Soviet Union has had no such dividend. Moreover, health systems in the region are struggling to keep up with the illnesses affecting the population today, and as that population ages, the pressure will be even greater.

Monica, Calif.: RAND CF-124: 36-82; Institut National d'Etudes Demographiques (2000): Demographie de la Russie sur la Toile

125 United Nations Population Division (2001) *ibid*

126 UNAIDS (2000): AIDS Epidemic Update. Geneva. December 2000.

Policy issues in this region are complex in the light of demography. The first priority must be health. The rise in death rates needs to be reversed and governments should take urgent action to prevent the spread of HIV/AIDS via both education and condom distribution. Vulnerable groups, such as drug users and sex workers, should be targeted, with business encouraged to play a role in prevention efforts. As several companies in Africa and Thailand have shown, the private sector can play a useful role in AIDS efforts, bringing its skills to the problem and helping to ease the burden on health systems.¹²⁷

In short, and in the absence of any demographic dividend to benefit from, the region is likely to be best served by focusing on health, welfare and the economy as a means of reaching long-term demographic stability and positioning itself to cope with an aging society.

127 David Bloom, Ajay Mahal and River Path Associates (2001): HIV/AIDS and the Private Sector – A Literature Review. American Foundation for AIDS Research. Forthcoming.

Chapter 4 The Importance of the Policy Environment

As the case studies show, several key policy variables influence nations' abilities to realize their "demographic dividend." This chapter explores several of these: health policies to improve public health and access to care; family planning and related reproductive health policies to help families achieve their desired size; education policies to increase access to schooling; and economic policies that promote labor-market flexibility, openness to trade, adequate credit and savings.

A. HEALTH EQUALS WEALTH

Improvements in public health are at the heart of the demographic transition. Decreased infant and child mortality, combined with increased life expectancy and finally a fall in fertility, brought about by improved sanitation, immunization programs, DDT, antibiotics and contraceptives, initiate the declines in mortality that lead to declines in fertility, which together cause changes in the age distribution and size of a population.

The health story does not end there, however. In recent years, evidence is mounting that health is also a key determinant of economic performance, counter to the frequently made assumption that causation runs only from wealth to health.¹²⁸ The WHO Commission on Macroeconomics and Health has found "substantial evidence showing that improved health of the population contributes to higher economic growth and poverty alleviation."¹²⁹ On the other hand, these findings are not clearly robust to the introduction of country fixed effects, which potentially suggests that the significant life expectancy coefficients are picking up more than just health effects on economic growth (i.e., they

¹²⁸ David E. Bloom and David Canning, "The Health and Wealth of Nations," *Science* No. 287: 1207-1209, 18 February, 2000. Also, David E. Bloom and David Canning, "The Health and Poverty of Nations: From Theory to Practice," unpublished manuscript, May 2001. Also, David E. Bloom, David Canning, and Jaypee Sevilla, "The Effect of Health on Economic Growth: Theory and Evidence." NBER Working Paper 8587. <http://www.nber.org/papers/w8587>

¹²⁹ Jeffrey Sachs, Chairman of the Commission, quoted in WHO South East Asia press release. 17 April 2000.

may be reflecting unobserved influences on growth that are correlated with life expectancy).¹³⁰

If a country is to promote the demographic transition and take advantage of the demographic dividend, five health policies should be prioritized:

- First, ensuring that infants receive effective medical care is of paramount importance, as a high degree of certainty about a child's chances of survival is vital to the completion of the demographic transition. Such certainty precludes the need to have more offspring and will mean that investment in education is concentrated in fewer children.
- Second, the health of women is critical for two main reasons. Women's access to reproductive health services is important for achieving desired family sizes. Women are also essential conduits of knowledge about health: A healthier woman will likely improve the health of her family.
- Third, children need to have adequate support for their health needs in order to ensure they maximize their opportunities in the education system, where poor health often contributes to educational under-achievement.¹³¹
- Fourth, as the baby boom generation enters the workforce, a proportion of the prosperity they generate will have to be channeled back into policies that improve their health. This is not an area where the market will necessarily suffice, as market failures in the public health area are pervasive, and the institutions and

¹³⁰ Caselli, F., Esquivel, G., and Lefort, F. 1996. Reopening the convergence debate: a new look at cross-country growth empirics. *Journal of Economic Growth* 1: 363-89. Similar findings arise using different specifications in unpublished work by the authors of this paper.

¹³¹ Jennifer Prah Ruger, Dean T. Jamison, and David E. Bloom, "Health and the Economy", in Michael Merson, B. Black, and Anne Mills, eds., *International Public Health: Diseases, Programs, Systems and Policies*, Aspen Publishers, 2001, pp. 617-666.

technologies that support health must instead be generated through efforts by the state, civil society, and families.¹³²

- Fifth, policies to improve health can prove a powerful weapon against social exclusion, which lessens or eliminates the contribution that certain groups make to the development of a society and to its positive demographic transition. Ill health causes poverty and it keeps people in poverty, both at a family and a national level. The World Bank has reported that when households become poorer, the most common reason is illness, injury, or death.¹³³

Implementation of policies to improve health is a complex process, with a range of medical, public health, and non-health interventions to choose from. Medical interventions, such as vaccines and drugs, primary health care centers, and clinics, offer the opportunity for high-profile, cost-effective action against clearly identified health problems. So called "vertical" interventions, such as vaccination campaigns, work best when they are conducted on a massive scale and where near-universal take-up multiplies the benefit. However, vertical interventions are currently poorly funded, and there is an overwhelming need for increased funding at an international level both for the development of new vaccines and cures, and for more effective delivery. This international public good is not being delivered by the market, with only 11 of 1223 new compounds launched on the market between 1975 and 1997 designed to tackle tropical diseases. Potential solutions include governments receiving more assistance from international organizations such as the Global Alliance for Vaccines and Immunization, or working more constructively with the private sector to fill the breach.¹³⁴

Non-medical interventions are aimed at working more broadly to strengthen health systems. Priorities include the need to develop better data for decision-making and to use these data to set priorities for decision-making. Ministries should aim to develop a new

132 How beneficent is the market? A look at the modern history of mortality. Richard A Easterlin. *European Review of Economic History*, 3, 257-294, 1999

133 *The Voices of the Poor*, available at <http://www.worldbank.org>

134 "Balm for the poor", *Economist*, 14th August 1999, available at <http://www.economist.com>

role that emphasizes facilitation, sponsorship of innovation, finance, and supervisory capabilities, beyond the traditional emphasis on delivery. Partnerships between the public sector, civil society, and the private sector have the potential to be fruitful, but these partnerships need leadership if they are to develop.¹³⁵

Health outcomes can also be improved by non-health policies and by exploiting positive feedback between different policy areas. “Virtuous spirals” are possible as, for example, educated people seek better health, while healthy people are more receptive consumers of education.

B. POPULATION POLICY AND THE FAMILY

Population policy has a direct impact on the speed, timing, and completion of the demographic transition, with corresponding effects on the amplitude of the demographic bulge. Although unproven, it is also plausible that a sharper transition has greater potential to lift an economy out of a poverty trap and onto a sustainable growth trajectory. This could have important policy implications, highlighting, for example, family planning as an instrument of economic growth above and beyond its contribution to reproductive health.

The Population Council estimates that at least 120 million women in developing countries have an unmet need for contraception, while the United Nations Population Fund estimates that half of the world’s 175 million pregnancies a year are unwanted or mistimed.¹³⁶ In developing countries, excluding China, approximately one-fourth of all births are unwanted.¹³⁷ Research suggests that if women were to reach (but not exceed) their desired family size, this would achieve targets for fertility reduction in 13 out of 17

¹³⁵ Michael R Reich (2000): Public-Private Partnerships for Public Health. *Nature Medicine* 6 (6): 617-620

¹³⁶ Population Council, *Why Women Who Don't Want to Get Pregnant Don't Use Contraception*, Population Briefs Volume 1, Number 2, June, 1995; *6 Billion – A Time for Choices*, The State of World Population, 1999, United Nations Population Fund

¹³⁷ John Bongaarts, 1999, *op cit.*

countries whose governments have quantitative targets to reduce fertility.¹³⁸ Lack of knowledge about contraceptive methods, concern about possible side effects, and the possibility of disapproval from partners and other members of the community, have been identified as key factors limiting access.¹³⁹ The impact of family planning programs on fertility rates has been highly significant, exceeding the impact of socioeconomic factors such as rising income. It has been estimated that programs have reduced fertility by between 1 and 1.5 births per woman and accounted for roughly 40 percent of the decline in fertility in the 1960s, 70s and 80s.¹⁴⁰ However, not all programs are equally effective. The most successful take advantage of latent demand for contraception and focus on lowering barriers to the take-up of services. This requires an emphasis on convenience, broad choice, and measures like social marketing that gradually overcome institutional resistance to women using contraception.¹⁴¹

Without trying to dictate the number of children couples may or should have, governments can at least put in place policies to facilitate family planning and respond to demand. Political support can help facilitate institutional change and encourage new forms of behavior. It is also vital for ensuring proper financing, especially in the critical phase where pilot programs are built on to provide near-universal coverage. As the use of contraception becomes institutionalized, however, governments may be able to withdraw, at least partially, from provision and financing, as other actors take responsibility for meeting a constant and established demand. Donor support is also important, through establishing an international climate that encourages the research, development, and roll-out of contraceptive services; by sponsoring a political dialogue to help build a consensus about the need for effective population policy; and by supporting governments as they develop national programs. Donors can also help promote delivery standards, provide

¹³⁸ Sinding, S., J. A. Ross, and A. G. Rosenfield (1994). "Seeking Common Ground: Unmet Need and Demographic Goals." In *International Family Planning Perspectives*, (20:1):23-27

¹³⁹ Bongaarts, John and Judith Bruce. 1995. "The causes of unmet need for contraception and the social content of services," *Studies in Family Planning* 26(2):57-75

¹⁴⁰ Bongaarts, John, "The Role of Family Planning Programs in Contemporary Fertility Transitions" in *The Continuing Demographic Transition*, ed GW Jones and J Caldwell, London: Oxford University, 1997

¹⁴¹ *The Value of Family Planning Programs in Developing Countries*, Rodolfo A Bulatao, 1998, RAND.

training at all levels, and help evaluate the comparative success – or otherwise – of national programs.¹⁴²

Other policies can have a powerful influence on reproductive behavior and health. Education is a vital influence on family size – more-educated parents face higher opportunity costs as their families grow, and are also likely to wish to educate their children to a high standard. Policies to improve the socio-economic position of women will have an impact on fertility similar to that of increasing the quantity and quality of education. Anti-discrimination regulation in the workplace and credit market, for example, will help improve women’s opportunities for employment and raise opportunity costs of having children. As women’s standing increases within a household, they are also more likely to drive institutional and cultural change, which will also lead to smaller families and improved opportunities for children.

The effect of the demographic transition on women is part of a more general impact on family structures and gender relations. Smaller families, increased empowerment of women, and urbanization are also associated with rising divorce rates. Family breakdown can have catastrophic social effects. Single-parent families and single-person households have become more common across the developed world, with approximately half of American marriages now ending in divorce and the marriage rate in Sweden now only 3.6 per 1000 inhabitants¹⁴³ (less than half the US rate). Children in single-parent families are more likely to be living in poverty than those from two-parent families. Additionally, working mothers will find child care prohibitively expensive without the support of extended families. Social exclusion can be the result.

Developing country policymakers in some countries may therefore be well advised to anticipate the time when their demographic transition has matured. They can expect declining or low and stable fertility rates; declining rates of marriage; high but stable divorce rates; increased cohabitation, lone parenting, and out-of-wedlock childbearing;

¹⁴² See Bulatao 1998, *op cit*

and medium to high rates of female labor force participation. By taking measures at this stage to support the development of a “new” family, they can attempt to leapfrog many of the problems that developed countries have faced.

C. POLICIES FOR LABOR AND FINANCIAL MARKETS, AND HUMAN CAPITAL

Having a larger, healthier and better-educated workforce will only bear economic fruit if the extra workers can find jobs. Open economies, flexible labor forces, and modern institutions that can gain the confidence of the population and markets alike may help countries to reap the potential benefit created by their demographic transition.

Openness to trade can be a key driver of economic growth, helping to significantly boost the benefits a country receives from the demographic transition.¹⁴⁴ If Latin America’s economy had been as open, as measured by the Sachs-Warner index, as East Asia’s between 1965-1990, it is estimated that per capita income would have reached US\$4,000 instead of US\$2,950, and poverty would have been substantially lower.¹⁴⁵ Access to world markets, backed up by export promotion, is thought by many to be an effective way to find sufficient demand for a nation’s output.¹⁴⁶ However, this view has been contested on both conceptual and empirical grounds.¹⁴⁷

A healthy degree of flexibility in labor markets is also vital if a country is to accommodate a burgeoning working-age population. Flexibility means that employers are able to rapidly

¹⁴³ The Great Disruption: Human Nature and the Reconstitution of Social Order, Francis Fukuyama, The Free Press, 1999

¹⁴⁴ Barro, R. 1997. The Determinants of Economic Growth: A Cross Country Empirical Study. Cambridge: MIT Press; Bloom, D. and Sachs, J. 1998. ‘Geography, demography, and economic growth in Africa’, *Brookings Papers on Economic Activity* 2, 207–73

¹⁴⁵ Bloom, D., Canning, D., Evans, D., Graham, B., Lynch, P., and Murphy, E. Population Change and Human Development in Latin America. In Inter-American Development Bank. 1999-2000 Report on Economic and Social Progress in Latin America

¹⁴⁶ Jeffrey Sachs and Andrew Warner, 1995. "Economic Reform and the Process of Global Integration," *Brookings Papers on Economic Activity*, Vol 1: 1-118.

¹⁴⁷ See, for example, Dani Rodrik ("Trading in Illusions," *Foreign Policy*, March-April 2001), who concludes, "Neither economic theory nor empirical evidence guarantees that deep trade liberalization will deliver higher economic growth. Economic openness and all its accouterments do not deserve the priority they typically receive in the development strategies pushed by leading multilateral organizations." For another provocative

expand and contract their businesses, to shift workers from one area of the business to another, and to raise and lower pay more easily. Flexibility also means a workforce that is able to adapt its working patterns as the business environment shifts. Flexibility can be difficult to “sell” to a workforce, as employers are commonly thought to reap the benefits while employees bear the costs, although the provision of adequate safety nets and generous re-training programs can help persuade workers to become less risk-averse.¹⁴⁸ Although recent history shows that designing and implementing effective programs along these lines is a challenging task in low- and middle-income countries, the incentives for proceeding in this direction are substantial. Many wealth industrial countries have successful programs that provide a good starting point for thinking both conventionally and imaginatively along these lines. In addition, recent research suggests that the presence of social protection programs is not closely correlated with different measures of labor market flexibility.¹⁴⁹

Minimum wage policy should be especially carefully designed. If wage levels are set (and enforced) above market rates, they effectively push low-skilled workers out of the formal economy into the informal economy. They also make legitimate companies less able to compete in foreign markets. In Brazil for instance, the minimum wage stood at 100 reales per month in May 1995, a level that exceeded actual earnings of almost 20 percent of workers. National and subnational governments may be able to create a sustainable balance by actively involving both workers and employers in discussions about minimum wage levels.

critique, see Arthur MacEwan, *Neoliberalism or Democracy?: Economic Strategy, Markets, and Alternatives for the 21st Century*. Zed Books, 2001.

¹⁴⁸ As a recent UNCTAD/UNDP paper on Jamaica has noted: “Policy-makers need to tread a particularly complex path as they try to deliver growth, improve Jamaica’s competitiveness, help displaced workers find new jobs in more productive sectors and provide some kind of security for those who lose out.” David E Bloom, Ajay S Mahal, Damien King, Fiorina Mugione, Aldrie Henry-Lee, Dillon Alleyne, Philip Castillo and River Path Associates (2001): ‘Jamaica: Globalisation, Liberalization and Sustainable Human Development’ UNCTAD/UNDP Programme on Globalisation, Liberalization and Sustainable Human Development. February 2001: 42

¹⁴⁹ Rebecca M. Blank, ed., *Social Protection Versus Economic Flexibility: Is There a Trade-off?* University of Chicago Press. Chicago. 1994.

Absorbing the baby boom generation into productive employment is more than just a matter of labor market flexibility. Any expanding economic enterprise (from small business to large country) is hungry for capital. Investment can come from savings – by government, business, or private individuals – or from overseas development assistance or foreign direct investment. Private household savings are one of the most powerful ways of financing growth, as the East Asian experience has shown. Individual savings are, in turn, dependent on demography and longevity. People save at different points in their lives, and they save for different purposes, most notably, their retirement.

Encouraging private savings and efficiently allocating them to investment requires reform of macroeconomic policy and financial institutions. Governance affects how much a country saves and whether those savings are productively invested. Latin America provides an example of a region where savings are low, while East Asia's much higher savings rates contributed substantially to its development. The demographic transition can encourage people to save – but only if saving seems relatively safe and relatively profitable. In order to promote saving, governments must attempt to provide price stability, as incentives to save are higher in environments with low inflation, and encourage competition, transparency and efficiency in the financial institutions.

When credit is scarce, the poor generally lose out more than others. However, the past two decades have seen the development of successful new models of microfinance by the private sector, NGOs, and the state. These have demonstrated the power of widespread credit in improving the lives of people in rural areas. Targeting low-income households, and giving credit that is often collateral-free and at significantly lower interest rates than those in the informal credit market, these institutions help microenterprises develop in rural areas and provide income-generation opportunities to poorer segments of the rural population. The work of Bangladeshi economist Professor Muhammad Yunus, and the Grameen Bank which he set up, have more than demonstrated the value of microcredit. Beginning with US\$50 and 20 borrowers, Grameen expanded rapidly: it now lends over US\$400 million annually to a membership base of over 2 million. The Grameen Bank concentrates on lending to women – who now make up 94 per cent of its clientele. So

far, almost half a million houses have been built as a result of its efforts. Meanwhile, the Grameen Bank's repayment rate of over 98 per cent would be the envy of all mainstream banks – and persuasively refutes the argument that the poor are inherently high-risk borrowers. Professor Yunus has also used the Grameen Bank to develop a range of social initiatives, including housing, sanitation, and education programs.¹⁵⁰

As countries pass through the demographic transition, they have the opportunity to examine past errors and learn from them. Many developing countries have been tempted to copy institutions and practices that evolved in the industrialized countries. Yet, in the current period of global transition, this may be a misguided strategy. Not only do industrialized countries operate in mature economies that have developed over long periods, but many of them are also finding that they, too, need to re-invent their institutional base, often rooted in the 19th century, for the challenge of the 21st. There is an interesting analogy with technological progress. No one suggests that developing countries should install analog telephone systems just because developed countries have these legacies. Instead, developing countries are free to leapfrog over the old and adopt new technologies more suited to the modern world.

Another advantage for developing countries lies in the very youth of the people striving to deliver the demographic dividend and the opportunity to invest in positioning them for future economic challenges. Much better positioned by their recent education and long work horizon to adapt to new and changing technology, they can bring their creativity and energy to bear in order to use it advantageously. Using the youthful population to make progress in the knowledge economy is a formidable – but not insuperable – task. It will require a willingness to invest in education at all levels, including higher education, and to attempt to offer people “education for life”, enabling them to retrain for fast-moving labor markets. Policymakers can use the demographic dividend to begin to shift resources towards broadening access to more advanced forms of education. As fertility rates fall, demand for primary education will drop and, over time, this effect will be repeated at

¹⁵⁰ Grameen Bank: www.grameen.org also lists several other academic and non-academic resources.

secondary level. However, demand for higher education will simultaneously be rising (at least for a period of time), as those leaving secondary education consider attempting to gain more advanced qualifications.¹⁵¹

Collectively, then, there are major problems to address, and no ready-made regulatory environment of proven success across many countries with which to address them. Yet some lessons can be learned from the past, and developing country policy-makers have the opportunity to build on these. By tapping into the energy and initiative of their baby boomers, they can promote the demographic dividend of economic growth. But, in order to avoid increasing social exclusion and unrest, they must do so in a way that protects and creates opportunities for the poor during a time of major economic transition. The economic and political challenge is to devise policies and programs in both the public and private arenas that judiciously blend social protection and economic flexibility. The long-run advantages of such a blend need to be balanced against concerns about possible short-run adjustment costs.

D. POLICIES FOR THE FUTURE: PLANNING FOR AN OLDER POPULATION

The powerful consequences of the demographic transition have the benefit of being persistent and predictable. Demography provides a crystal ball that allows a policymaker to make policies for tomorrow's world, not yesterday's.

In some regions of the world, planning now for rising numbers of old people is essential. As populations get older, and older people remain healthier, countries face a new set of challenges. People over 65 can expect another 15 years of healthy life. Over time, these will be increasingly healthy years. Retirement in most countries is currently between 60 and 65. Increased life expectancy and an aging population are the final iterations of the demographic transition. With the changing structures of families, older people can easily become more isolated, financially as well as emotionally. Pension systems that were designed to support a small older population will come under increasing strain. Developed

¹⁵¹ See the Task Force on Higher Education's report: Higher Education in Developing Countries: Peril and

countries are likely to feel this pressure first. Spending on pensions could push Japan's budget deficit up to 20 percent of GDP by 2030, as the country becomes the oldest in the world.¹⁵² Either pension contributions will have to increase to 35% of salaries, or the level of pension benefits will have to decrease. Japan's pension system is particularly at risk because of the rapidity of its population aging.

Pension reform in developing countries is therefore a high priority. Pay-as-you-go pensions systems, where pensions are funded from current government revenues, are likely to become increasingly difficult to sustain, and the demographic transition should hasten the worldwide trend towards fully-funded pensions. In a fully-funded system, individuals save for their own retirement and, since the vast majority contain some element of compulsion, increase levels of national savings. Fully-funded systems come with their own problems, of course; in particular, they require countries to have a financial system developed enough to provide sufficient high-quality savings vehicles, and a government to have the ability to prudently regulate the financial institutions that will manage these funds. However, pioneering schemes, such as those found in Latin America, have provoked much debate and opened up a series of new methods of pension provision.¹⁵³ It is worth noting that pension reform is a particularly important issue for women, who live significantly longer lives than men in most countries in the world. Women typically outnumber men at older ages, and the difference is large among the oldest old. At ages 60 or older, there were an estimated 81 men for every 100 women globally in 2000, and at ages 80 or older there were only 53 men for every 100 women. Female advantage in life expectancy at birth is currently around 3 years in developing countries, but may eventually reach the average difference of 8 years in developed regions.

Promise available at www.tfhe.net

¹⁵² David E Bloom, AK Nandakumar, Manjiri Bhawalkar (2001): *The Demography of Aging in Japan and the United States*. 2001 forthcoming

¹⁵³ Nitsch, M.; Schwarzer, H.: *Recent development in financing social security in Latin America*. Issues in Social Protection, discussion paper 1. (Geneva, ILO, Social Security Department, 1996, 59 p.) ISBN 92-2-110275-0, <http://www.ilo.org/public/english/protection/socsec/publ/discus1.htm>

As the demographic transition progresses, financing for health care becomes even more important, with countries undergoing an epidemiological transition where non-communicable diseases (such as diabetes, heart disease, and cancer) become predominant. These changes lead to sizable increases in health care expenditures. Data from the world's wealthy industrial countries reveal that health care expenditures per capita are roughly three times higher for the elderly than for the non-elderly. Elder care will be borne increasingly by institutions other than the family, most likely nursing homes. Again, many developing countries will need to move towards systems that link an individual's benefits to his/her contributions and thus limit inequitable intergenerational transfers. Peru, for example, has created legislation to allow workers to choose between the traditional social insurance system and private insurance.

Public-private partnerships are likely to be needed in many areas of social policy, as governments alone will be unable to cope with vast demographic changes, and markets alone will leave some areas unattended. Such partnerships provide innovative ways for the public and private sector to share costs and administrative duties associated with the provision of social services. In the developed world, it is interesting to note how government is under pressure to act in a more business-like fashion, while business (especially large corporations) is facing increasing demands to accept more social responsibility. While government must become more efficient trustees of the taxpayers' money, business needs to explore the effects on its bottom line of a whole range of factors – from better educated workers to improved environmental performance.¹⁵⁴

¹⁵⁴ David E Bloom, Patricia Craig, Marc Mitchell (2000): Public and Private Roles in Providing and Financing Social Services: Health and Education. ADBI Publishing. October 2000; Michael R Reich (2000): Public-Private Partnerships for Public Health. *Nature Medicine* 6 (6): 617-620

Chapter 5 Conclusions

Population neutralism, which has focused on the effects of population *growth*, has encouraged economists to neglect demography when considering the future prosperity and development of the world's countries. A focus on population *structure*, however, offers policymakers a vital tool as they plan for and manage the changes their countries face.

For developing countries, the demographic transition offers significant opportunities, but opportunities that are unlikely to recur. They must therefore act soon to implement the policy mix required to accelerate the demographic transition and make its effects more pronounced. As mortality declines, policies to facilitate family planning and push down fertility rates should follow. Such measures will have broader collateral impacts than just reducing fertility – women will have more time to work and their health will be improved.

A focus on education at all levels will prepare the baby boom generation for its future incorporation into the workforce. Practical, relevant curricula (taking into account the importance of changing technology as well as, for example, the health problems that beset societies) can give developing countries a better chance of catching up to some of the more advanced societies, many of whose education systems have problems of their own.

As they begin to realize their demographic dividend, countries will be able to continue to invest in the development process. In principle, openness to trade combined with flexible labor markets will create work opportunities for the enlarged working-age cohort. Encouraging savings and investment via reform of financial institutions and targeting the poor with microfinance programs will give countries the resources to prepare for the future, when the boom generation passes out of the workforce.

A failure to act on these issues could have a damaging effect on future prospects, as unemployment rises, the social fabric crumbles, and rising numbers of old people begin to overwhelm available resources. Reform will be needed, and necessary reform will

inevitably be controversial. The demographic transition changes society profoundly and fundamentally influences family structure, the status of women and children, and the way people work. Policymakers must therefore work hard to explain the changes that are happening and articulate the policies that are needed to take full advantage of them.

Demography provides a clear narrative within which policies can be framed and a powerful lens through which priorities can be identified. Embracing and understanding demographic challenges must therefore be a priority for all governments, as they build the broad partnerships that will be necessary to secure change.

References

- Asian Development Bank. 1997. Emerging Asia. Manila.
- Becker, G. 1960. An Economic Analysis of Fertility, in Universities--National Bureau Committee for Economic Research. Demographic and Economic Change in Developed Countries. Princeton: Princeton University Press, pp 209-31.
- Becker, G. 1981. A Treatise on the Family. Cambridge: Harvard University Press.
- Bloom, D. and Canning, D., "The Health and Wealth of Nations," Science No. 287: 1207-1209, 18 February, 2000.
- Bloom, D., and Canning, D., "The Health and Poverty of Nations: From Theory to Practice," unpublished manuscript, May 2001.
- Bloom, D., Canning, D., and Sevilla, J., "The Effect of Health on Economic Growth: Theory and Evidence." NBER Working Paper 8587. <http://www.nber.org/papers/w8587>
- Bloom, D., Mahal, A., Sevilla, J., and River Path Associates, "AIDS and Economics," paper prepared for Working Group 1 of the WHO Commission on Macroeconomics & Health. 2001.
- Bloom, D., and Canning, D. 2001. "Cumulative Causality, Economic Growth, and the Demographic Transition," In Birdsall, N., Kelley, A., and Sinding, S. eds. Population Matters: Demography, Growth, and Poverty in the Developing World. pp. 165-197. Oxford University Press.
- Bloom, David E., Patricia H. Craig, and Pia N. Malaney. 2001. The Quality of Life in Rural Asia. Oxford University Press.
- Bloom, D., Canning, D., and Malaney, P. 2000. "Demographic Change and Economic Growth in Asia." Population and Development Review. Vol. 26, supp., pp 257-290. Bloom, David E., A. K. Nandakumar, and Manjiri Bhawalkar. "The Demography of Aging in Japan and the United States" in Gail B. Hedges, ed., Aging and Health: Environment, Work and Behavior, Harvard University Printing and Publication, forthcoming 2001.
- Bloom, D., and Sachs, J. 1998. "Geography, Demography, and Economic Growth in Africa." Brookings Papers on Economic Activity 2, 207-73.
- Bloom, D. and Williamson, J. 1998. "Demographic Transitions and Economic Miracles in Emerging Asia." World Bank Economic Review 12, 419-56.
- Bloom, David E., "Population Growth, Structure, and Policy: Comment", in Andrew Mason, Thomas Merrick, and R. Paul Shaw, eds., Population Economics, Demographic Transition, and Development: Research and Policy Implications, Washington, D.C.: World Bank, 1999.

- Bongaarts, John. "Future Population Growth and Policy Options" in Andrew Mason, Thomas Merrick, and R. Paul Shaw, eds., *Population Economics, Demographic Transition, and Development: Research and Policy Implications*, Washington, D.C.: World Bank, 1999.
- Bongaarts, John. 1994. "Population Policy Options in the Developing World." *Science* 263, 771-6.
- Boserup, E. 1965. *The Conditions of Agricultural Progress*. London: Allen and Unwin.
- Boserup, E. 1981. *Population and Technological Change: A Study of Long Term Trends*. Chicago: University of Chicago Press.
- Coale, A. and Hoover, E. 1958. *Population Growth and Economic Development in Low-Income Countries*. Princeton, New Jersey: Princeton University Press.
- Condorcet, M. J. A. N. 1795. *Sketch for a Historical Picture of the Progress of the Human Mind*, trans. J. Barraclough (London, 1955).
- Ehrlich, P. 1968. *The Population Bomb*. New York: Ballantine.
- Fogel, R. 1994b. The Relevance of Malthus for the Study of Mortality Today: Long-Run Influences on Health, Mortality, Labour Force Participation, and Economic Growth. NBER WP H0054
- Fogel, R. 1994a. Economic Growth, Population Theory, and Physiology: the Bearing of Long-Term Processes on the Making of Economic Policy. NBER WP 4638.
- Fogel, R. 1995. The Contribution of Improved Nutrition to the Decline in Mortality Rates in Europe and America, in Julian Simon, ed., *The State of Humanity*. Cambridge, MA: Blackwell Publishers.
- Furedi, F. 1997. *Population and Development: a critical introduction*. New York: St. Martin's Press.
- Galor, O., and Weil, D. (1999). "From Malthusian Stagnation to Modern Growth" *American Economic Review, Papers and Proceedings* 89(2): 150-4.
- Godwin, W. 1793. *An enquiry concerning political justice, and its influence on general virtue and happiness*. New York: Woodstock Books, 1992.
- Godwin, W. 1820. *Of Population*. London: J. McGowan.
- Hayek, F.A. 1988. *the fatal conceit: the errors of socialism* (from *The Collected Works of F A Hayek*, volume 1, 1988). Chicago: University of Chicago Press.
- Higgins, M. 1998. "Demography, National Savings, and International Capital Flows." *International Economic Review* 39, 343-69.
- Hirschman, Albert. 1958. *The Strategy of Economic Development*. New Haven: Yale University Press.
- Jones, G. 1986. *Social Hygiene in Twentieth Century Britain*. Wolfeboro, N.H.: Croom Helm.
- Kelley, A. 2001. "The Population Debate in Historical Perspective: Revisionism Revised." In Birdsall, N., Kelley, A., and Sinding, S. eds. *Population Matters: Demography, Growth, and Poverty in the Developing World*. pp. 24-54. Oxford University Press.
- Kelley, A. and Schmidt, R. 1995. "Aggregate Population and Economic Growth Correlations: The Role of the Components of Demographic Change." *Demography* 32, 543-55.
- 1996. "Savings, Dependency, and Development." *Journal of Population Economics* 9, 365-86.

- , 2000. "Economic and Demographic Change: A Synthesis of Models, Findings, and Perspectives." In Birdsall, N., Kelley, A., and Sinding, S. eds. Population Matters: Demography, Growth, and Poverty in the Developing World. Oxford University Press.
- Kennedy, P. 1993. *Preparing for the Twenty-First Century*. New York: Random House.
- Keynes, J.M. 1920. *The Economic Consequences of the Peace*. New York: Harcourt, Brace.
- Keynes, J.M. 1937. Some Economic Consequences of a Declining Population. *Eugenics Review* 29, 13-17.
- Kuznets, S. 1960. Population Change and aggregate output. In Universities--National Bureau Committee for Economic Research, *Demographic and Economic Change in Developed Countries*. Princeton: Princeton University Press.
- Kuznets, S. 1967. "Population and Economic Growth." Proceedings of the American Philosophical Society 111, 170-93.
- Lewis, W.A. 1955. *Theory of Economic Growth*. London: Allen & Unwin.
- Lindh, T. and B. Malmberg. 1998. "Age structure and inflation - a Wicksellian interpretation of the OECD data." Journal of Economic Behavior & Organization 36(1): 19-37.
- Lindh, T. and B. Malmberg. 1999a. "Age structure effects and growth in the OECD, 1950-1990." Journal of Population Economics 12: 431-449.
- Lindh, T. and B. Malmberg. 1999b. *Age Structure and the Current Account. A Changing Relation?* Uppsala, Uppsala University, Dept. of Economics.
- Lindh and B. Malmberg. 2000. "Can Age Structure Forecast Inflation Trends?" Journal of Economics and Business 52(1/2): 31-49.
- Lustig, Nora, ed., 2001. *Shielding the Poor: Social Protection in the Developing World*. Washington, DC: Brookings Institution Press and Inter-American Development Bank.
- Malmberg, B. 1994. "Age Structure Effects on Economic Growth--Swedish Evidence." Scandinavian Economic History Review 42(3): 279-95.
- Malmberg, B. and T. Lindh. 2000. "Population Change and Economic Growth in the Western World, 1850-1990." Social Science History Association meeting, Pittsburgh.
- Malthus, T. R. (1798). *Essay on the Principle of Population, As It Affects the Future Improvement of Society with Remarks on the Speculation of Mr. Godwin, M. Condorcet, and Other Writers*, Penguin Classics ed. (Harmondsworth, 1982).
- Mankiw, N.G., Romer, D., and Weil, D. (1992). "A Contribution to the Empirics of Economic Growth." Quarterly Journal of Economics 1992, 407-437.
- Mason, Andrew, ed., 2001. *Population Change and Economic Development in East Asia: Challenges Met, Opportunities Seized*, Stanford University Press.
- Meade, J. 1967. Population Explosion, the Standard of Living, and Social Conflict. *Economic Journal* 77: 233-55.

- Mill, J.S. 1848. *Principles of Political Economy*. The World's Classics, 1994. New York: Oxford University Press.
- Myrdal, G. 1940. *Population: A Problem for Democracy*. Cambridge: Harvard University Press.
- North, D. and Thomas, R. 1970. An Economic Theory of the Growth of the Western World. *Economic History Review*, 23(1): 1-17.
- Paes de Barros, R., Firpo, S., Guedes Barreto, R., and Pereira Leite, P. G., "Demographic Changes and Poverty in Brazil." In Birdsall, N., Kelley, A., and Sinding, S. eds. Population Matters: Demography, Growth, and Poverty in the Developing World. pp. 296-321. Oxford University Press.
- Petty, W. 1682. Another Essay in Political Arithmetic. in Hull, C.H. ed. 1899. *The Economic Writings of Sir William Petty*. Cambridge: Cambridge University Press.
- Ricardo, D. 1817. *The Principles of Political Economy and Taxation*. (London: Dent, 1984).
- Samuelson, P. 1958. An Exact Consumption Loan Model of Interest With or Without the Social Contrivance of Money', *Journal of Political Economy* 66, 923-33.
- Samuelson, P. 1975. The Optimum Growth Rate for Population', *International Economic Review* 16, 531-8.
- Schultz, T.W. 1974. Population Effects of the Value of Human Time. *Journal of Political Economy* 82(2): S2-S10, reprinted in *The Economics of Being Poor*, 1993. Oxford: Basil Blackwell.
- Sen, A. 1994. Population and Reasoned Agency. in Lindahl-Kiesling, K. and Londberg, H. 1994. *Population, Economic Development and the Environment: The Making of Our Common Future*. New York: Oxford University Press.
- Simon, J. 1981. The Ultimate Resource. Princeton: Princeton University Press.
- Simon, J. 1986. *Theory of Population and Economic Growth*. New York: Blackwell.
- Solow, R. 1956. A Contribution to the Theory of Economic Growth. *Quarterly Journal of Economics*, 70. 531-38.
- Spengler, Joseph. 1966. Was Malthus Right? in *Population Economics: Selected Essays of Joseph Spengler*, compiled by Robert Smith, Frank de Vyver, and William Allen, 1972. Durham: Duke University Press.
- Stone, R. 1976. Demographic Variables in the Economics of Education. In Ansley Coale, ed., *Economic Factors in Population Growth*. New York: John Wiley and Sons.
- United Nations. 2001. *World Population Prospects: The 2000 Revision*. CD-ROM.
- Weil, D. (1997). The Economics of Population Aging. In Rosenzweig, M., and Stark, O., eds., *Handbook of Population and Family Economics*. Elsevier Science Press.
- Weil, D. (1999). "Population Growth, Dependency, and Consumption." American Economic Review, Papers and Proceedings 89(2): 251-5
- Willis, R. 1994. Economic Analysis of Fertility in Lindahl-Kiesling, K. and Londberg, H. 1994. *Population, Economic Development and the Environment: The Making of Our Common Future*. New York: Oxford University Press.
- World Bank. 1994. The East Asian Miracle. New York: Oxford University Press.

TABLES AND FIGURES

Table 1
World Billions

1 billion in 1804
2 billion in 1927 (123 years later)
3 billion in 1960 (33 years later)
4 billion in 1974 (14 years later)
5 billion in 1987 (13 years later)
6 billion in 1999 (12 years later)
7 billion in 2012 (13 years later)
8 billion in 2026 (14 years later)
9 billion in 2043 (17 years later)

Source: Population Division, Department of Economic and Social Affairs, UN Secretariat. *Population Newsletter No 66*, December 1998; and United Nations, *World Population Prospects: The 2000 Revision*

Table 2
Total Population in 2001, by Region, Sub-Region, and Country
 (thousands)

Area, region, sub-region, or country	Population	Share of world population
WORLD	6,134,135	
More developed regions¹	1,193,861	19.5%
Less developed regions²	4,940,274	80.5%
Least developed countries³	674,954	11.0%
AFRICA	812,603	13.2%
Eastern Africa	256,673	4.2%
Burundi	6,502	
Comoros	727	
Djibouti	644	
Eritrea	3,816	
Ethiopia	64,459	
Kenya	31,293	
Madagascar	16,437	
Malawi	11,572	
Mauritius	1,171	
Mozambique	18,644	
Réunion	732	
Rwanda	7,949	
Seychelles	81	
Somalia	9,157	
Uganda	24,023	
United Republic of Tanzania	35,965	
Zambia	10,649	
Zimbabwe	12,852	
Middle Africa	98,151	1.6%
Angola	13,527	
Cameroon	15,203	
Central African Republic	3,782	
Chad	8,135	
Congo	3,110	
Democratic Republic of the Congo	52,522	
Equatorial Guinea	470	
Gabon	1,262	
Sao Tome and Principe	140	

¹ United Nations, World Population Prospects: The 2000 Revision defines "more developed regions" as "all regions of Europe plus Northern America, Australia/New Zealand and Japan."

² United Nations, World Population Prospects: The 2000 Revision defines "less developed regions" as "all regions of Africa, Asia (excluding Japan), Latin America and the Caribbean plus Melanesia, Micronesia and Polynesia."

³ United Nations, World Population Prospects: The 2000 Revision follows the United Nations General Assembly's 1998 definition of "least developed countries" as these 48 countries: Afghanistan, Angola, Bangladesh, Benin, Bhutan, Burkina Faso, Burundi, Cambodia, Cape Verde, Central African Republic, Chad, Comoros, Democratic Republic of the Congo, Djibouti, Equatorial Guinea, Eritrea, Ethiopia, Gambia, Guinea, Guinea-Bissau, Haiti, Kiribati, Lao People's Democratic Republic, Lesotho, Liberia, Madagascar, Malawi, Maldives, Mali, Mauritania, Mozambique, Myanmar, Nepal, Niger, Rwanda, Samoa, São Tomé and Príncipe, Sierra Leone, Solomon Islands, Somalia, Sudan, Togo, Tuvalu, Uganda, United Republic of Tanzania, Vanuatu, Yemen and Zambia. These countries are also included in the less developed regions, except where otherwise stated.

Area, region, sub-region, or country	Population	Share of world population
Northern Africa	177,391	2.9%
Algeria	30,841	
Egypt	69,080	
Libyan Arab Jamahiriya	5,408	
Morocco	30,430	
Sudan	31,809	
Tunisia	9,562	
Western Sahara	260	
Southern Africa	50,129	0.8%
Botswana	1,554	
Lesotho	2,057	
Namibia	1,788	
South Africa	43,792	
Swaziland	938	
Western Africa	230,259	3.8%
Benin	6,446	
Burkina Faso	11,856	
Cape Verde	437	
Côte d'Ivoire	16,349	
Gambia	1,337	
Ghana	19,734	
Guinea	8,274	
Guinea Bissau	1,227	
Liberia	3,108	
Mali	11,677	
Mauritania	2,747	
Niger	11,227	
Nigeria	116,929	
Saint Helena	6	
Senegal	9,662	
Sierra Leone	4,587	
Togo	4,657	
ASIA	3,720,705	60.7%
Eastern Asia	1,491,772	24.3%
China	1,284,972	
China, Hong Kong SAR	6,961	
China, Macao SAR	449	
Dem. People's Republic of Korea	22,428	
Japan	127,335	
Mongolia	2,559	
Republic of Korea	47,069	
South-central Asia	1,506,727	24.6%
Afghanistan	22,474	
Bangladesh	140,369	
Bhutan	2,141	
India	1,025,096	
Iran (Islamic Republic of)	71,369	
Kazakhstan	16,095	
Kyrgyzstan	4,986	
Maldives	300	
Nepal	23,593	
Pakistan	144,971	
Sri Lanka	19,104	
Tajikistan	6,135	
Turkmenistan	4,835	
Uzbekistan	25,257	

Area, region, sub-region, or country	Population	Share of world population
South-eastern Asia	529,762	8.6%
Brunei Darussalam	335	
Cambodia	13,441	
East Timor	750	
Indonesia	214,840	
Lao People's Democratic Republic	5,403	
Malaysia	22,633	
Myanmar	48,364	
Philippines	77,131	
Singapore	4,108	
Thailand	63,584	
Viet Nam	79,175	
Western Asia	192,445	3.1%
Armenia	3,788	
Azerbaijan	8,096	
Bahrain	652	
Cyprus	790	
Georgia	5,239	
Iraq	23,584	
Israel	6,172	
Jordan	5,051	
Kuwait	1,971	
Lebanon	3,556	
Occupied Palestinian Territory	3,311	
Oman	2,622	
Qatar	575	
Saudi Arabia	21,028	
Syrian Arab Republic	16,610	
Turkey	67,632	
United Arab Emirates	2,654	
Yemen	19,114	
EUROPE	726,312	11.8%
Eastern Europe	302,619	4.9%
Belarus	10,147	
Bulgaria	7,867	
Czech Republic	10,260	
Hungary	9,917	
Poland	38,577	
Republic of Moldova	4,285	
Romania	22,388	
Russian Federation	144,664	
Slovakia	5,403	
Ukraine	49,112	
Northern Europe	95,236	1.6%
Channel Islands	145	
Denmark	5,333	
Estonia	1,377	
Faeroe Islands	47	
Finland	5,178	
Iceland	281	
Ireland	3,841	
Isle of Man	76	
Latvia	2,406	
Lithuania	3,689	
Norway	4,488	
Sweden	8,833	
United Kingdom	59,542	

Area, region, sub-region, or country	Population	Share of world population
Southern Europe	145,050	2.4%
Albania	3,145	
Andorra	90	
Bosnia and Herzegovina	4,067	
Croatia	4,655	
Gibraltar	27	
Greece	10,623	
Holy See	1	
Italy	57,503	
Malta	392	
Portugal	10,033	
San Marino	27	
Slovenia	1,985	
Spain	39,921	
TFYR Macedonia	2,044	
Yugoslavia	10,538	
Western Europe	183,407	3.0%
Austria	8,075	
Belgium	10,264	
France	59,453	
Germany	82,007	
Liechtenstein	33	
Luxembourg	442	
Monaco	34	
Netherlands	15,930	
Switzerland	7,170	
LATIN AMERICA AND THE CARIBBEAN	526,533	8.6%
Caribbean	38,329	0.6%
Anguilla	12	
Antigua and Barbuda	65	
Aruba	104	
Bahamas	308	
Barbados	268	
British Virgin Islands	24	
Cayman Islands	40	
Cuba	11,237	
Dominica	71	
Dominican Republic	8,507	
Grenada	94	
Guadeloupe	431	
Haiti	8,270	
Jamaica	2,598	
Martinique	386	
Montserrat	3	
Netherlands Antilles	217	
Puerto Rico	3,952	
Saint Kitts and Nevis	38	
Saint Lucia	149	
Saint Vincent and the Grenadines	114	
Trinidad and Tobago	1,300	
Turks and Caicos Islands	17	
United States Virgin Islands	122	
Central America	137,480	2.2%
Belize	231	
Costa Rica	4,112	
El Salvador	6,400	
Guatemala	11,687	
Honduras	6,575	
Mexico	100,368	
Nicaragua	5,208	
Panama	2,899	

Area, region, sub-region, or country	Population	Share of world population
South America	350,724	5.7%
Argentina	37,488	
Bolivia	8,516	
Brazil	172,559	
Chile	15,402	
Colombia	42,803	
Ecuador	12,880	
Falkland Islands (Malvinas)	2	
French Guiana	170	
Guyana	763	
Paraguay	5,636	
Peru	26,093	
Suriname	419	
Uruguay	3,361	
Venezuela	24,632	
NORTHERN AMERICA	317,068	5.2%
Bermuda	63	
Canada	31,015	
Greenland	56	
Saint Pierre et Miquelon	7	
United States of America	285,926	
OCEANIA	30,915	0.5%
Australia/New Zealand	23,146	0.4%
Australia	19,338	
New Zealand	3,808	
Melanesia	6,627	0.1%
Fiji	823	
New Caledonia	220	
Papua New Guinea	4,920	
Solomon Islands	463	
Vanuatu	202	
Micronesia	528	0.0%
Guam	158	
Kiribati	84	
Marshall Islands	52	
Micronesia (Federated States of)	126	
Nauru	13	
Northern Mariana Islands	76	
Palau	20	
Polynesia	613	0.0%
American Samoa	70	
Cook Islands	20	
French Polynesia	237	
Niue	2	
Pitcairn	0	
Samoa	159	
Tokelau	1	
Tonga	99	
Tuvalu	10	
Wallis and Futuna Islands	15	
Less developed regions excluding China	3,647,893	59.5%
Less developed regions excluding the least developed countries	4,265,320	69.5%
Sub-Saharan Africa	667,022	10.9%

Source: United Nations, World Population Prospects: The 2000 Revision

Table 3
Annual Population Growth Rates
Asia and Sub-regions
(percent)

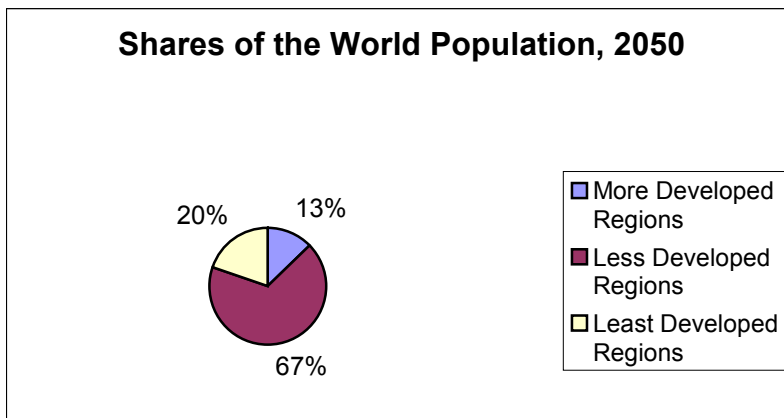
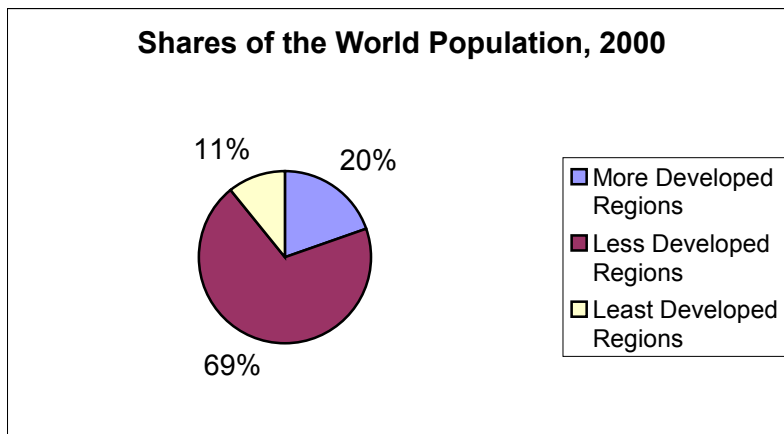
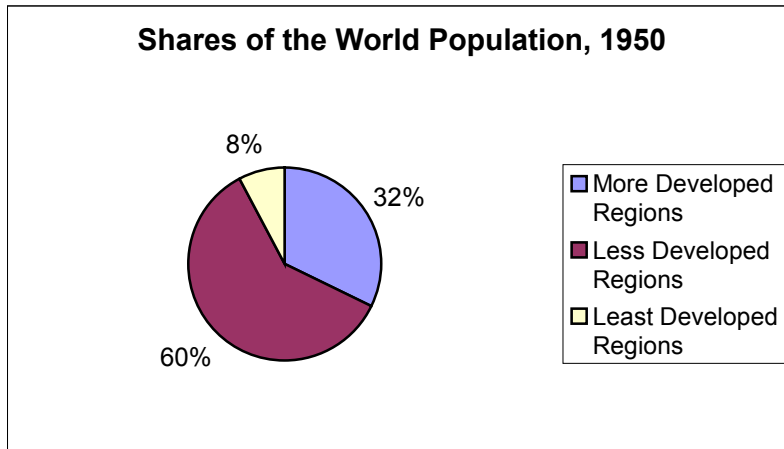
	1965 - 1990			1990-2015			2015-2040		
	Total population	Working-age population	Non-working-age population	Total population	Working-age population	Non-working-age population	Total population	Working-age population	Non-working-age population
ASIA	2.06	2.51	1.44	1.30	1.64	0.69	0.72	0.57	1.02
Eastern Asia	1.75	2.43	0.66	0.74	0.94	0.32	0.18	-0.36	1.24
South-central Asia	2.28	2.49	2.02	1.69	2.17	0.94	1.00	1.11	0.77
South-eastern Asia	2.26	2.66	1.74	1.43	2.00	0.43	0.80	0.68	1.04
Western Asia	2.76	3.06	2.39	2.17	2.51	1.65	1.58	1.68	1.42

Table 4
Annual Population Growth Rates, Percent

	1965 - 1990			1990-2015		
	Total population	Working-age population	Non-working-age population	Total population	Working-age population	Non-working-age population
WORLD	1.84	2.14	1.39	1.27	1.54	0.81
More developed regions	0.69	0.90	0.29	0.22	0.24	0.19
Less developed regions	2.23	2.63	1.70	1.52	1.87	0.94
Least developed countries	2.52	2.50	2.55	2.54	2.78	2.26
Less developed regions excluding China	2.39	2.63	2.07	1.78	2.20	1.14
Less developed regions excl the least dev countries	2.19	2.65	1.57	1.36	1.75	0.67
Sub-Saharan Africa	2.82	2.74	2.91	2.51	2.73	2.26
AFRICA	2.77	2.77	2.77	2.36	2.67	1.99
Eastern Africa	2.92	2.86	2.98	2.50	2.71	2.26
Middle Africa	2.78	2.48	3.11	3.05	3.06	3.04
Northern Africa	2.57	2.87	2.22	1.76	2.46	0.65
Southern Africa	2.48	2.75	2.14	0.90	1.25	0.35
Western Africa	2.83	2.70	2.98	2.66	2.97	2.30
ASIA	2.06	2.51	1.44	1.30	1.64	0.69
Eastern Asia	1.75	2.43	0.66	0.74	0.94	0.32
South-central Asia	2.28	2.49	2.02	1.69	2.17	0.94
South-eastern Asia	2.26	2.66	1.74	1.43	2.00	0.43
Western Asia	2.76	3.06	2.39	2.17	2.51	1.65
EUROPE	0.52	0.69	0.20	-0.10	0.00	-0.30
Eastern Europe	0.61	0.76	0.33	-0.40	-0.09	-1.07
Northern Europe	0.34	0.38	0.27	0.16	0.22	0.06
Southern Europe	0.60	0.79	0.22	-0.02	-0.06	0.07
Western Europe	0.38	0.64	-0.10	0.19	0.08	0.41
LATIN AMERICA AND THE CARIBBEAN	2.28	2.74	1.71	1.44	1.91	0.65
Caribbean	1.62	2.06	1.02	1.00	1.31	0.47
Central America	2.67	3.19	2.08	1.67	2.27	0.72
South America	2.23	2.67	1.64	1.41	1.85	0.64
NORTHERN AMERICA	1.01	1.40	0.37	0.93	0.99	0.79
OCEANIA	1.66	1.96	1.17	1.30	1.35	1.20
Australia/New Zealand	1.48	1.82	0.88	1.01	1.02	1.01
Melanesia	2.38	2.57	2.15	2.21	2.57	1.69
Micronesia	2.57	2.98	2.05	2.18	2.21	2.14
Polynesia	1.69	2.36	0.90	1.18	1.55	0.60

Source: United Nations, World Population Prospects: The 2000 Revision

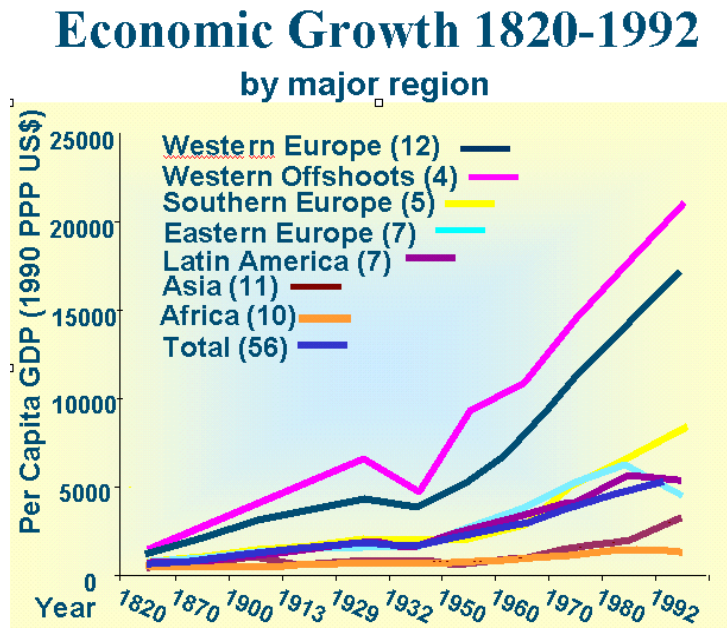
Figure 1



Source: United Nations, World Population Prospects: The 2000 Revision.

Note: The UN defines "Least Developed Nations" to be a subset of "Less Developed Nations." By contrast, these charts completely separate the two categories, removing the "least developed" nations from the "less developed."

Figure 2



Source: David E Bloom (2000): Demographic Transitions and Economic Miracles. Prepared for the Video Conference on 17 May 2000 between the American University in Cairo and the World Bank Institute, Washington DC.

Figure 3

GDP per capita growth against population growth, 1965-1990

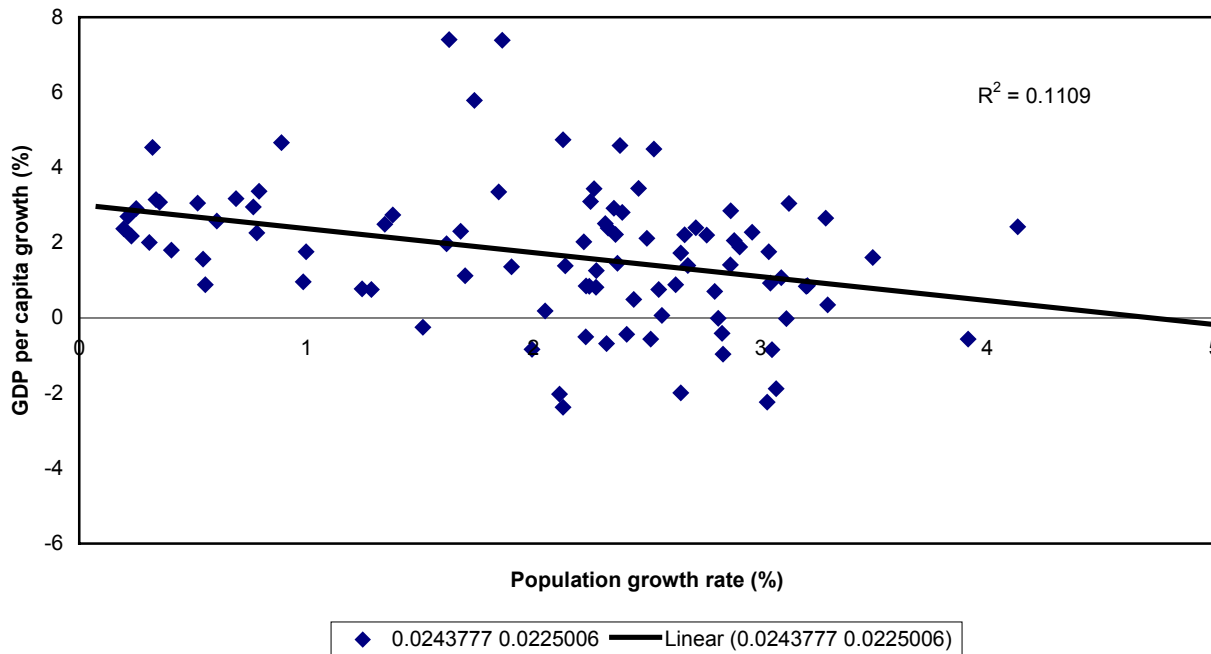


Figure 4

Overall population growth rate and the economic growth residual

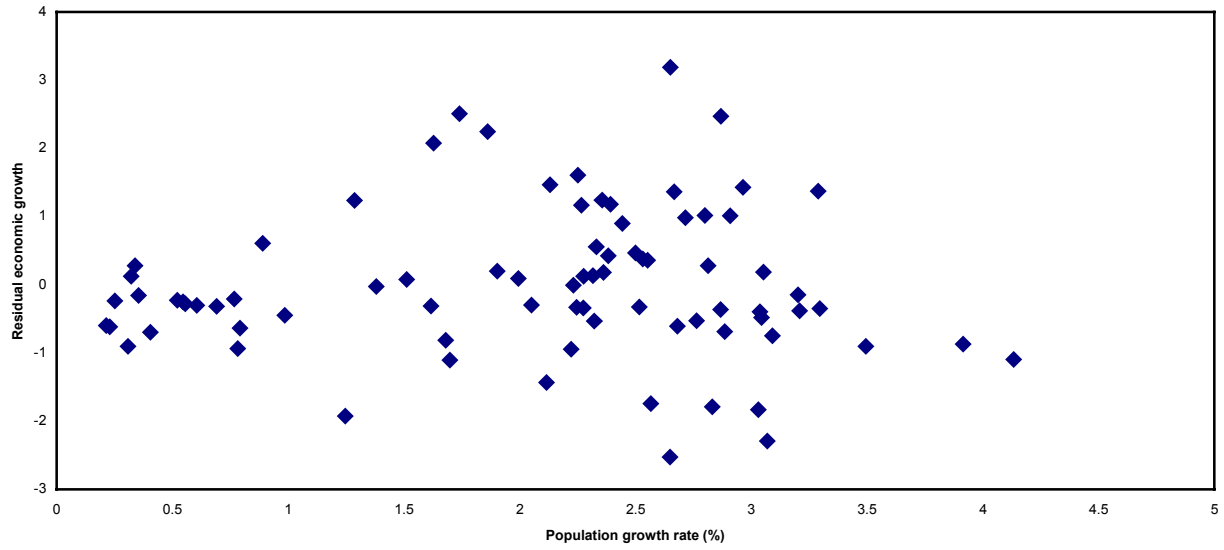


Figure 5

Life cycle income and consumption

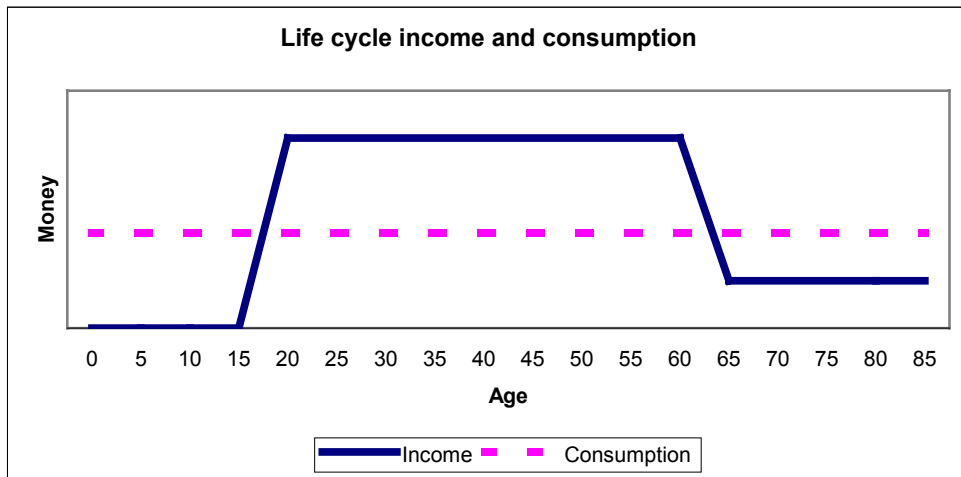


Figure 6

Population Growth and the Age Structure

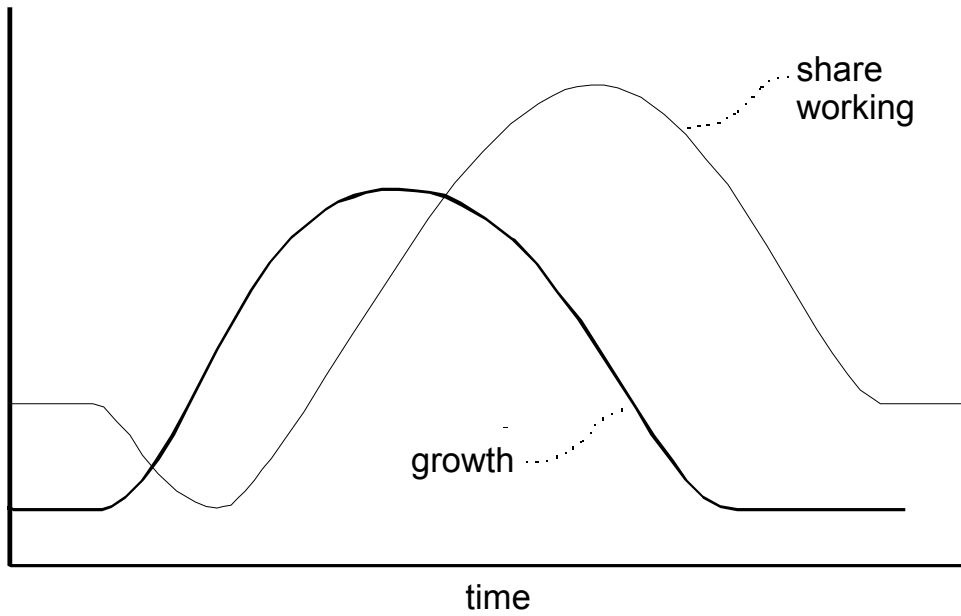
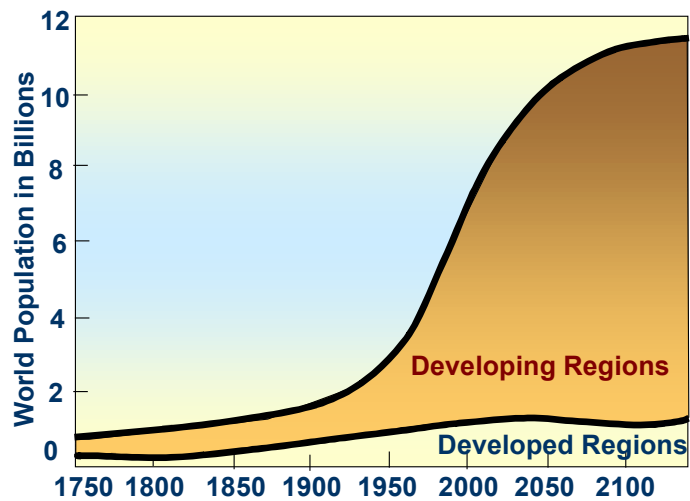


Figure 7

World Population, 1750 - 2150



Source: Population Reference Bureau (2001). Human Population: Fundamentals of Growth, Population Growth and Distribution. Available at http://www.prb.org/Content/NavigationMenu/PRB/Educators/Human_Population/Population_Growth/Population_Growth.htm

Figure 8

Population by Region

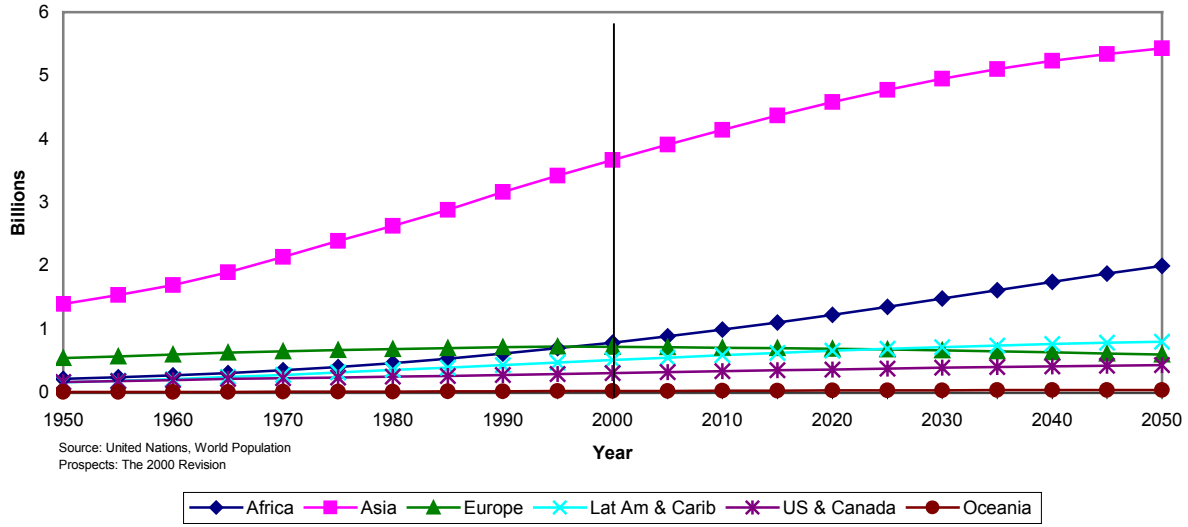


Figure 9

Infant Mortality Rate at Different Levels of Development

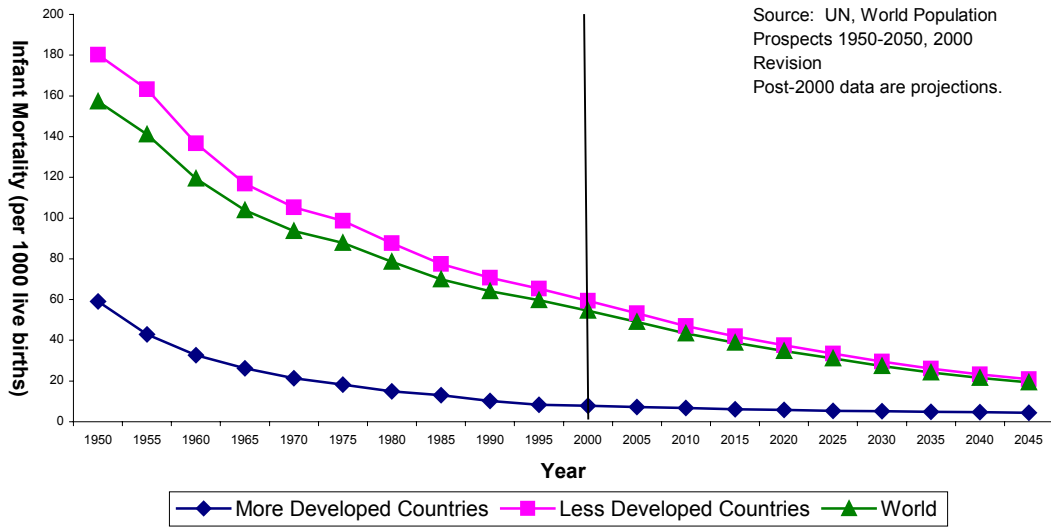


Figure 10
Fertility Rate at Different Levels of Development

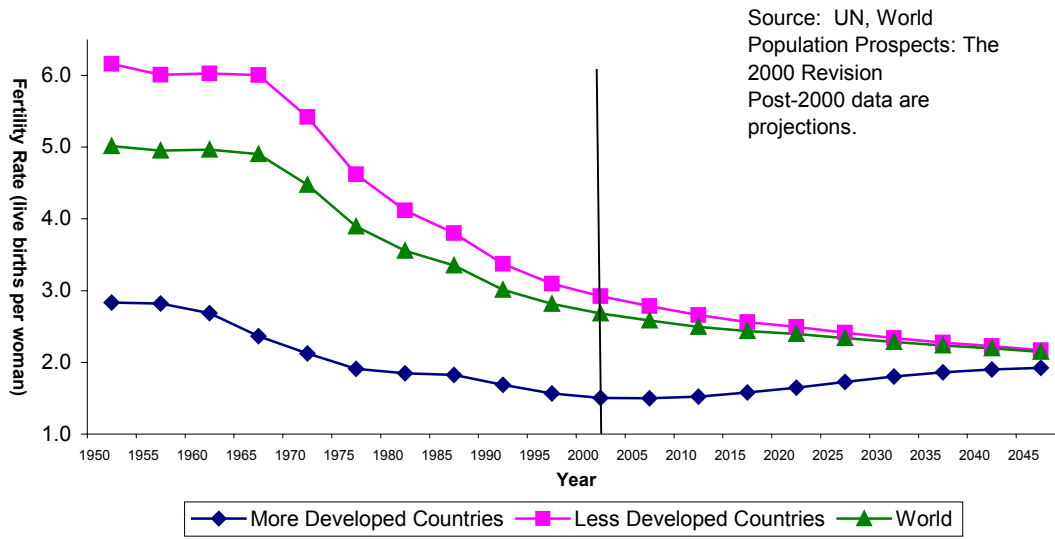


Figure 11
The Demographic Transition

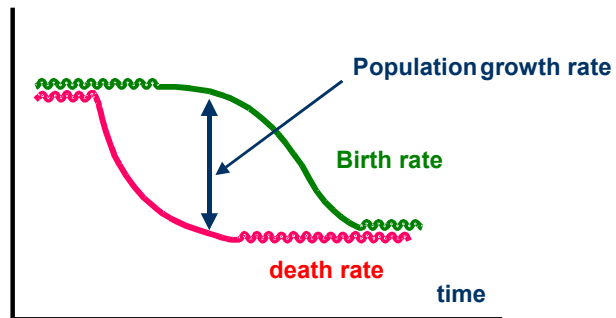


Figure 12
Population Growth Rate Over the Course of the Demographic Transition

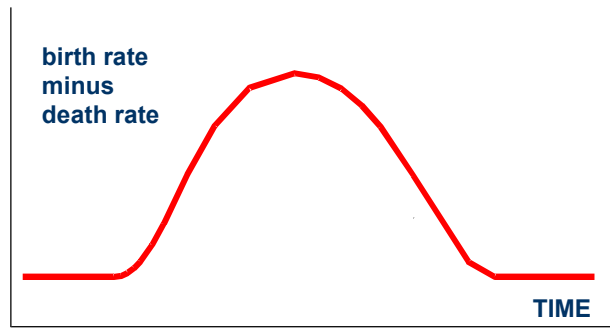
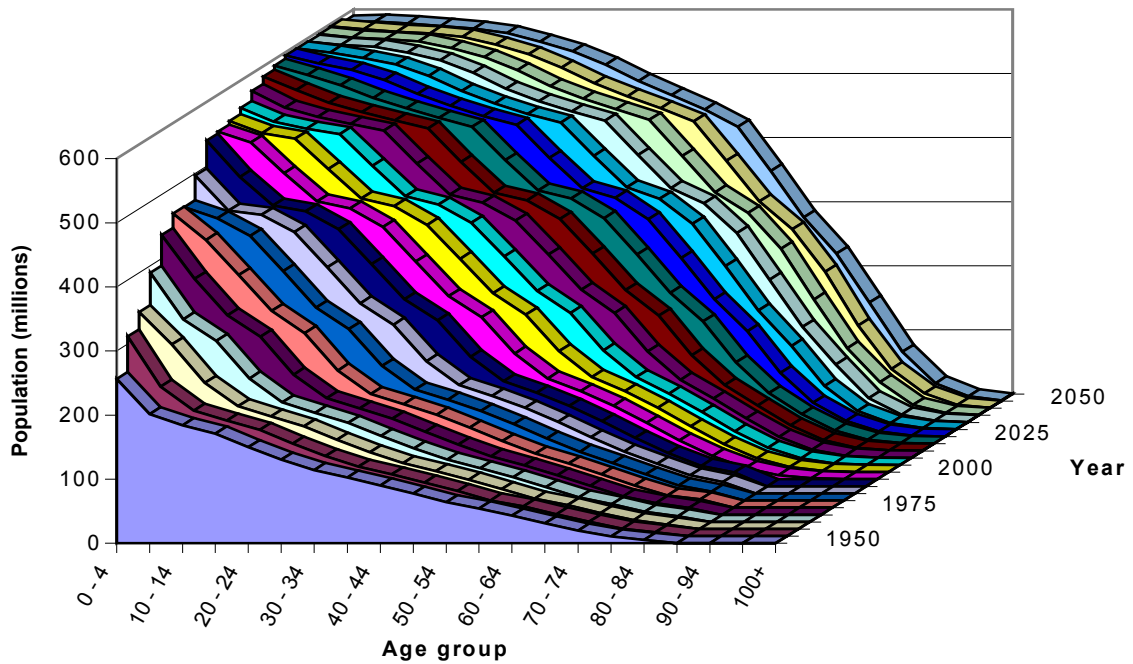


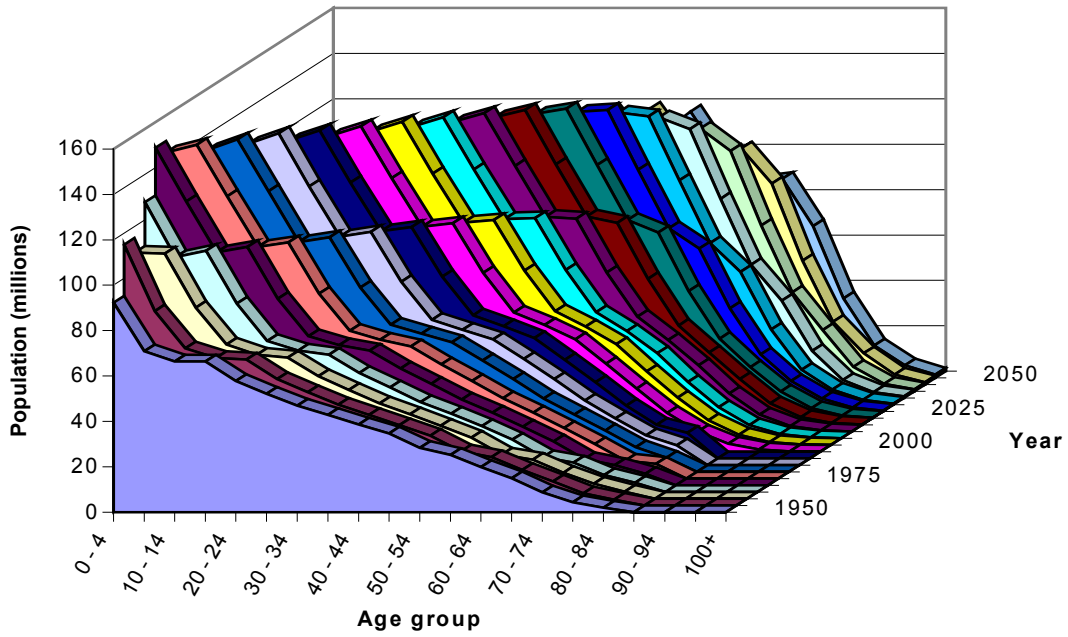
Figure 13
Population by Age Group and Year, Less Developed Regions



Source: UN, World Population Prospects: The 2000 Revision

Figure 14

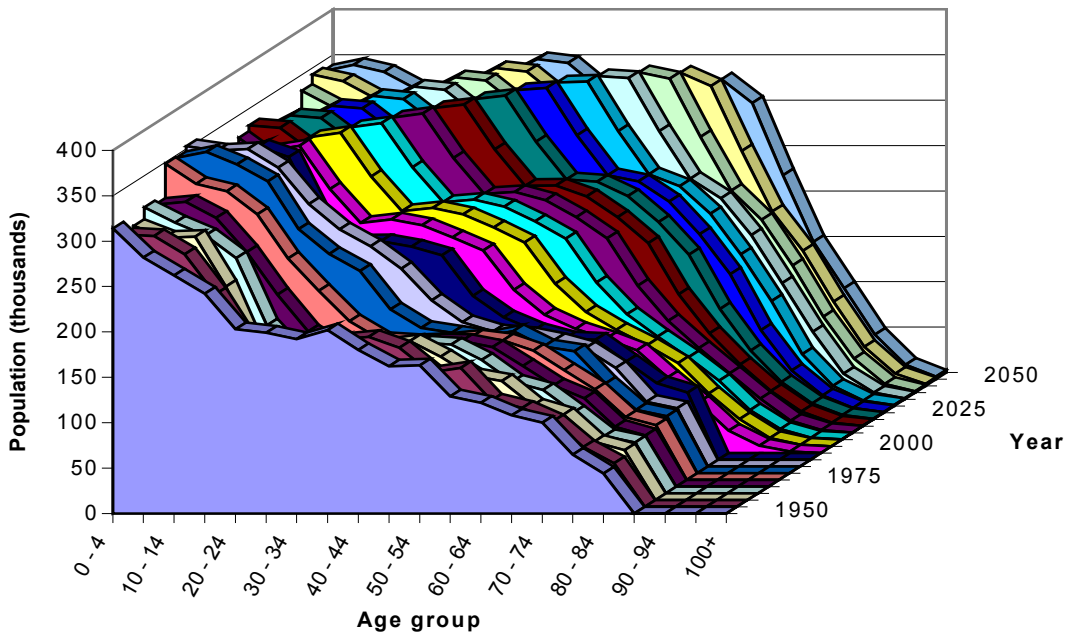
Population by Age Group and Year, East Asia



Source: UN, World Population Prospects: The 2000 Revision

Figure 15

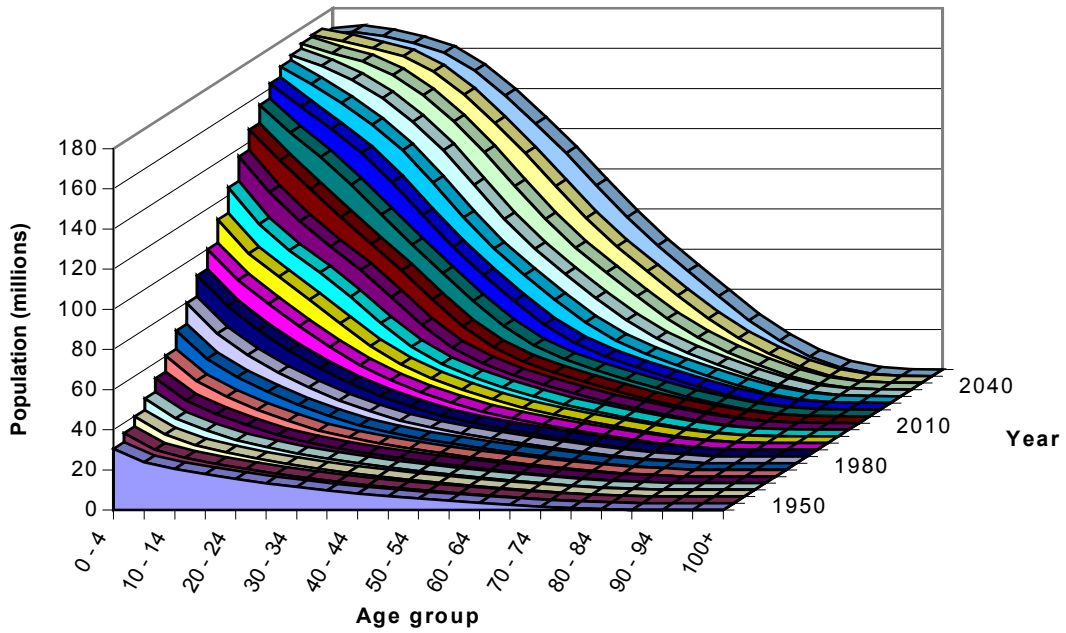
Population by Age Group and Year, Ireland



Source: UN, World Population Prospects: The 2000 Revision

Figure 16

Population by Age Group and Year, Sub-Saharan Africa



Source: UN, World Population Prospects: The 2000 Revision

Figure 17

Share of Working-Age Population by Region

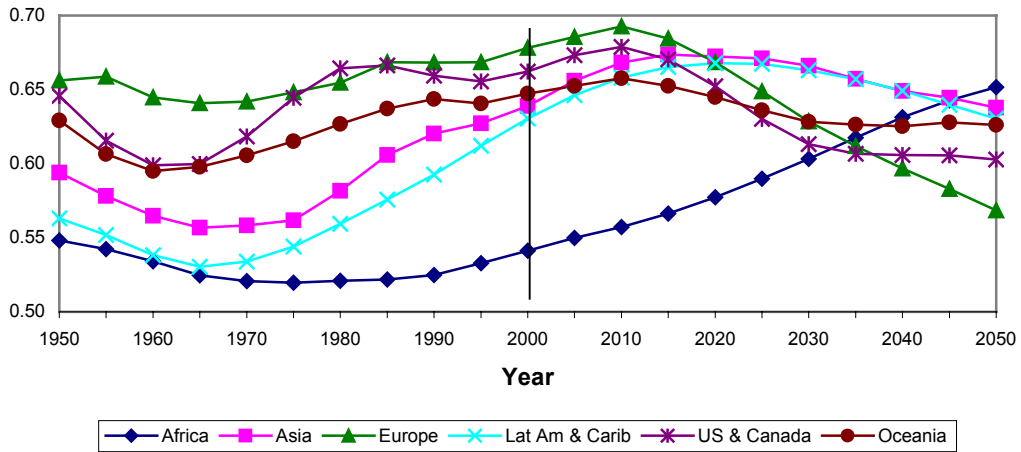


Figure 18
Share of Working-Age Population, Specific Areas

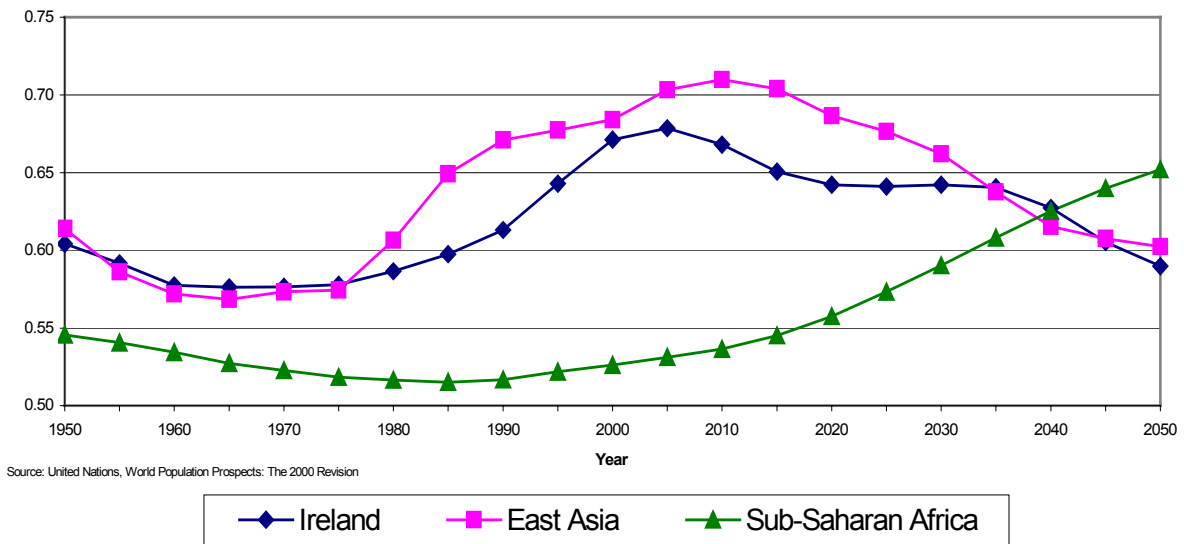


Figure 19

Labor force participation by age group, 1990

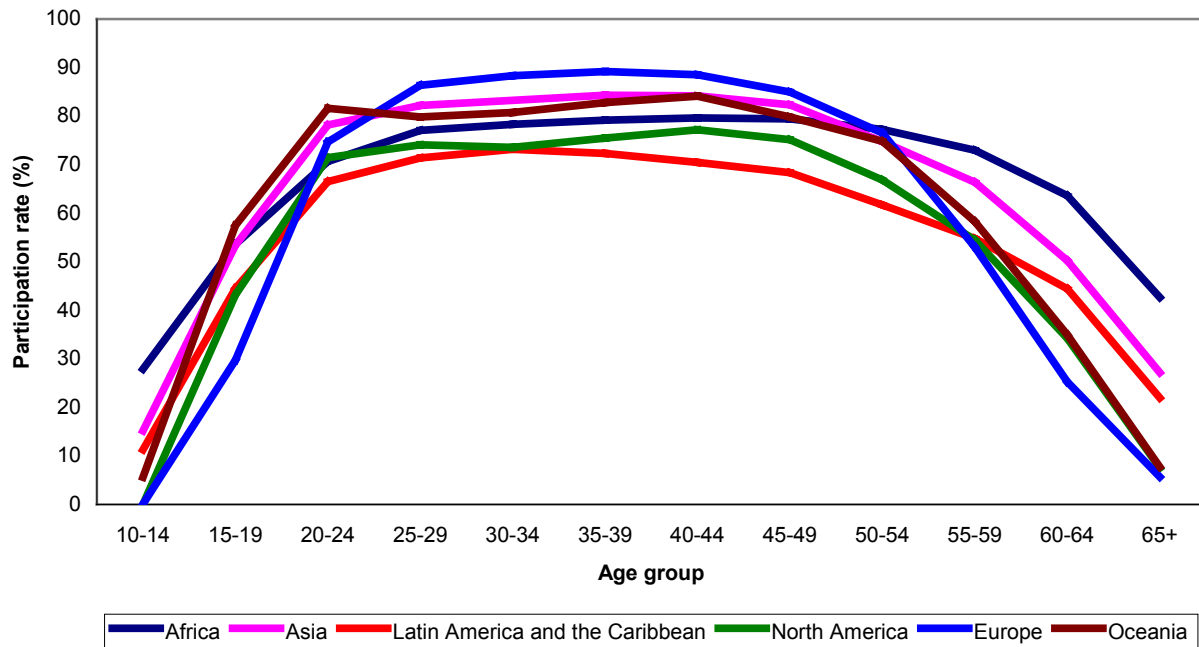
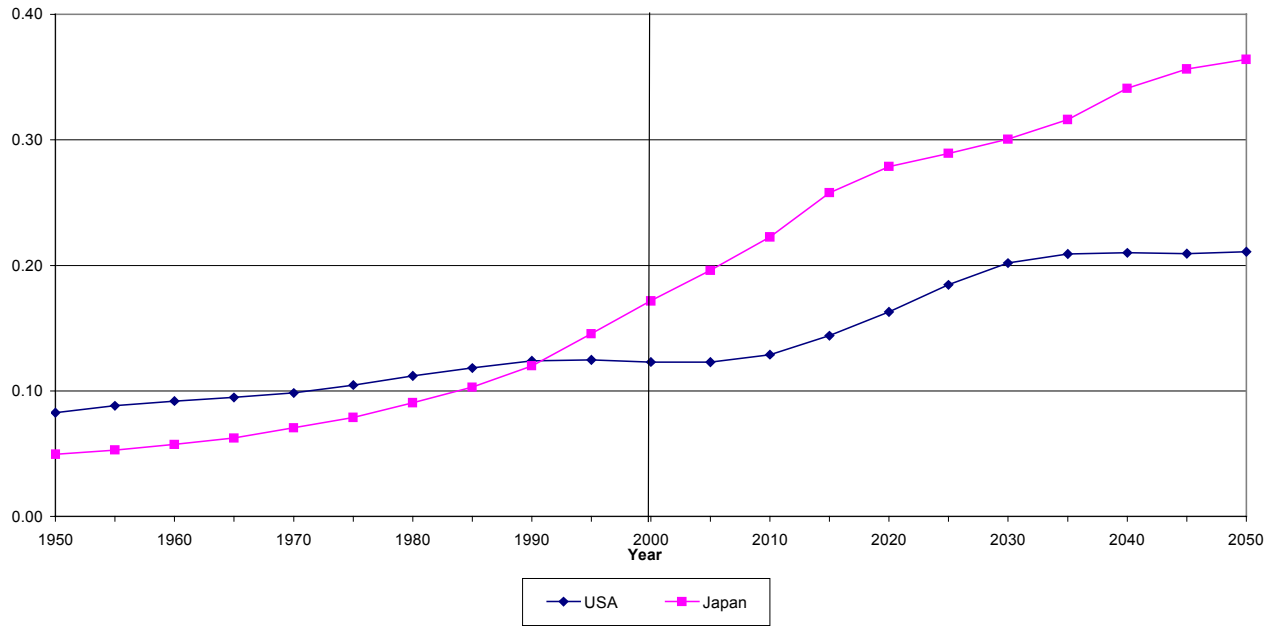


Figure 20

Population share 65+



Source: United Nations, World Population Prospects: The 2000 Revision