

## 5 The consequences of rapid population growth

This chapter shows that rapid population growth—at rates above 2 percent, common in most developing countries today—acts as a brake on development. Up to a point, population growth can be accommodated: in the past three decades many countries have managed to raise average income even as their populations grew rapidly. In that strict sense, population growth has been accommodated. But the goal of development extends beyond accommodation of an ever larger population; it is to improve people's lives. Rapid population growth in developing countries has resulted in less progress than might have been—lost opportunities for raising living standards, particularly among the large numbers of the world's poor.

The conclusion that rapid population growth has slowed development is by no means straightforward or clearcut (see Box 5.1). Under certain conditions moderate population growth can be beneficial. As Chapter 4 showed, in Europe, Japan, and North America economic growth has been accompanied by moderate population growth, which may have stimulated demand, encouraged technological innovation, and reduced investment risks. Moderate labor force growth, combined with extra spending on education, can also mean continuous upgrading of the labor force with better educated workers. In sparsely populated countries, faster population growth shortens the time required to reach the population size that provides economies of scale in transport, communications, social services, and production. Some developing countries could benefit from such economies of scale, especially in rural areas. And a big population can increase a country's economic as well as political and military power; in a world of economic and political uncertainty, countries such as India and China can seem to benefit from the sheer size of their domestic markets.

But these benefits derive from a moderate increase in population. Most developing countries

are experiencing growth that, by historical standards, is faster than that. Even in uncrowded countries, the long-term benefits of having more people must be weighed against the immediate costs of coping with rapid growth. In those few countries lacking the people to exploit their natural resources, immigration from neighboring countries, if politically feasible, would be less costly and more effective than a fast natural rate of population growth. And the economic success of many small countries—Denmark, Hong Kong, Singapore, and Switzerland—shows that urbanization and trade provide other means to achieve the scale economies of a large population.

There are several reasons why population growth in developing countries is today a greater economic burden than it once was in today's developed countries:

- Population growth is now much more rapid. As Chapter 4 showed, in industrializing Europe it seldom exceeded 1.5 percent a year, compared with the 2 to 4 percent that most developing countries have averaged since World War II.
- Unlike nineteenth century Europe, large-scale emigration from today's developing countries is not possible.
- Compared with Europe, Japan, and North America in their periods of fastest population growth, income in developing countries is still low, human and physical capital are less built up, and in some countries political and social institutions are less well established.
- Many developing countries whose economies are still largely dependent on agriculture can no longer draw on large tracts of unused land.

This chapter begins by emphasizing that the implications of population growth differ considerably among countries, depending on their current social, economic, and political conditions. Next it reviews how rapid population growth affects the economy as a whole through savings and investment. It then considers the experience of countries

## Box 5.1 Consequences of population growth: conflicting views

The traditional Malthusian concern is that population growth will sooner or later run up against the limits of the earth's finite stock of resources. In his *First Essay on Population*, Malthus argued that the inherent capacity of population to grow exceeds the earth's capacity to yield increases in food, because of limits to the supply of cultivable land. Unrestrained population growth eventually leads to falling wages and rising food prices because, as the labor force expands, a rising ratio of labor to land leads to smaller and smaller increments in output per worker. Population growth is ultimately checked by rising mortality.

In the twentieth century this argument has been extended to the availability of energy and minerals, the effects of rising environmental pollution, and so on. In *The Limits to Growth*, Club of Rome researchers built a simulation model on the assumption that the pace of technological change would be insufficient to overcome diminishing returns arising from limited supplies of essential resources. Falling standards of living and increasing levels of pollution would lead to a population collapse within 100 years.

A related view is that some resources—land, forests, fisheries—though fixed, are renewable, but that their sustainable yields do have a maximum limit. Some harvests may exceed this maximum, but they lead to a permanent reduction in the long-run productivity of land. A population whose needs (subsistence and commercial) exceed sustainable yields will have lower per capita incomes in the long run.

The claim of diminishing returns to resources can easily be criticized for its failure to recognize that, as resources are depleted, rising prices reduce consumption and speed the search for substitutes, stimulating technological change. This criticism, extended, leads to the argument that there are no real natural

resource limits, because population growth itself brings the adjustments that continually put off doomsday. To quote from Julian Simon's book, *The Ultimate Resource*: "The ultimate resource is people—skilled, spirited, and hopeful people—who will exert their wills and imaginations for their own benefit and so, inevitably, for the benefit of us all." Simon argues that natural resources are not limited; that scarcity is revealed by prices; and that prices of resources are not rising, at least not as a proportion of the income of the United States. More people implies more ideas, more creative talent, more skills, and thus better technology; in the long run population growth is not a problem but an opportunity.

These different viewpoints each contain important truths. Some resources are finite; even if prices have not increased (and they may have done so in relation to incomes outside the United States), there have been fundamental structural changes in the balance between population and resources. Human ingenuity might be a match for these changes, but it might be able only to maintain income, not to lift millions of people out of poverty. Or it may reduce poverty very slowly: even with the assumption of technological change built into Simon's model, there are "short-run" difficulties. His short run is thirty to eighty years, and in that period he finds even moderate population growth to be detrimental to human welfare. In the short run, ideas may be lost and Einsteins go undiscovered if many children receive little schooling. Policy-makers and poor people live in the short run; they do not wish to go through a period of greater deprivation to adapt eventually to rapid population growth.

At the same time, there is little doubt that the key to economic growth is people, and through people the advance of

human knowledge. Per capita measures of income should not be used to imply that the denominator, people, contributes nothing to the numerator, total income. Nor is population growth in and of itself the main cause of natural resource problems—air pollution, soil degradation, even food availability.

This Report therefore takes a position that is neither hopeless nor overly optimistic. The difficulties caused by rapid population growth are not primarily due to finite natural resources, at least not for the world as a whole. But neither does rapid population growth itself automatically trigger technological advance and adaptation. If anything, rapid growth slows the accumulation of skills that encourage technological advance, and insofar as there are diminishing returns to land and capital, is likely to exacerbate income inequalities. This is most obvious at the family level, where high fertility can contribute to a poor start in life for children. But it is also true for countries as a whole.

Moreover, the costs of rapid population growth differ greatly from country to country. Those differences are not confined to differences in natural resources. In countries heavily reliant on agriculture, a scarcity of natural resources does matter. But the underlying problem is low income and low levels of education, which are sources of rapid population growth and simultaneously make the required adjustments to it more difficult. Much of the world's population lives without the benefit of clear signals to encourage smaller families; yet these are the families and the nations in the worst position to make the adaptive responses that rapid population growth requires. That is why rapid population growth is, above all, a development problem.

in coping with rapidly growing populations—their efforts to achieve food security, the effects on their natural resources, the pressures of internal migration and urban growth, and the options that the international economy provides. Throughout this

discussion of the effects of population growth on countries, this chapter will touch on a theme introduced in Chapter 4: the implications of high fertility for poor people and for income inequality. Because the poor are usually last in line for jobs,

school places, and public health services, they are more likely to be penalized by rapid population growth.

The chapter does not treat a reduction in the rate of population growth as a panacea for development; macroeconomic and sectoral policies matter at least as much. But it does show that within most countries, for any given amount of resources, a slower rate of population growth would help to promote economic and social development.

### **Differences among countries**

The implications of population growth differ considerably among developing countries. Countries where education levels are already high, where much investment in transport and communications systems is in place, and where political and economic systems are relatively stable, are well equipped to cope with rapid population growth. This is true whether or not their natural resources are limited or their countries already "crowded," as in the fast-growing East Asian economies such as Hong Kong, Korea, Singapore, and more recently Malaysia and Thailand. But these tend also to be countries where population growth is now slowing.

Countries with untapped natural resources could in the long run support more people. But rapid population growth makes it hard for them to develop the human skills and administrative structures that are needed to exploit their resources. In Brazil, Ivory Coast, and Zaire, for example, the development of unused land will require large complementary investments in roads, public services, and drainage and other agricultural infrastructure. Natural resources are not by themselves sufficient (or even necessary) for sustained economic growth.

Where the amount of new land or other exploitable resources is limited—as in Bangladesh, Burundi, China, Egypt, India, Java in Indonesia, Kenya, Malawi, Nepal, and Rwanda—the short-run difficulties are more obvious. In some areas crop yields are still relatively low, leaving room for rapid growth in agricultural production; in others, the expansion of manufacturing industry could provide exports to pay for extra food imports. But both solutions require costly investments, development of new institutions, and numerous economic and social adjustments—all easier if population is growing only slowly.

In any society, change becomes easier if technology is advancing rapidly. From one point of view,

population growth itself helps to bring about technological change: in agricultural societies it may help spur the development of new farming methods needed to maintain per capita output. In earlier centuries it may even have helped provide the minimum population required to support a small religious or artistic elite.

But throughout the modern technological era, there is no evidence that a large or rapidly growing population has itself been influential in promoting new technology. The money and research skills needed for important advances—the Green Revolution, for example—are overwhelmingly in the rich countries where population growth is slow. If anything, these advances have brought labor-saving, not labor-using, innovations. Although adjustment and technical progress can accompany population growth, slower population growth would permit them to raise average incomes all the faster.

### **Macroeconomic effects of rapid population growth**

In a crude arithmetical sense, differences in population growth rates since the 1950s have helped to perpetuate international differences in per capita incomes. Between 1955 and 1980, GNP grew at about 4 percent a year in the low-income countries. This growth in general produced modest increases in income per person (see Table 5.1). However, in many of the poorest countries—Bangladesh and most of sub-Saharan Africa—economic activity slowed considerably in the 1970s. Coupled with rapid (and in some cases, accelerating) population growth, this economic slowdown resulted in stagnating or declining per capita incomes.

In most middle-income countries GNP growth has been much faster—between 5 and 6 percent a year—so that even with rapid population growth, per capita income grew by about 3 percent a year. Industrial countries achieved only sluggish GNP growth during the 1970s, but their low population growth—1 percent a year or less—meant that their increases in per capita income were in general almost as large as in the high-growth, middle-income countries. These increases came on top of much higher initial incomes, so that the absolute gulf between them and the rest of the world widened considerably.

The middle-income countries have shown that rapid population growth can go hand in hand with substantial gains in per capita income. But the long-run relation is more complex than that

implied by a simple division of total income by numbers of people. Indeed, that simple division implies, wrongly, that people are the problem. One question is how population growth affects the distribution of income within countries, and especially growth in income of poorer groups (see Box 5.2). More generally, the question is whether a rapid pace of population growth helps or harms economic growth. There are several ways population growth can affect economic growth: through its influence on savings per person, on the amount of capital invested per person, and on the efficiency with which the economy operates.

though its effects on monetized savings are small. First, the bulk of monetized household savings in developing countries is produced by relatively few wealthy families. They tend to have few children, so their savings are little affected by the burden of their dependents. In contrast, the majority of families are poor and save little. Parents have no choice but to pay for what their children consume by reducing their own consumption or by "dissaving"—for example, by farming their land more intensively than can be sustained in the long run. If parents have more children than they want, their ability to make best use of the resources they

TABLE 5.1  
**Growth of population, GNP, and GNP per capita, 1955–80**  
*(average annual percentage change)*

Country group	Population		GNP		GNP per capita	
	1955–70	1970–80	1955–70	1970–80	1955–70	1970–80
All developing countries	2.2	2.2	5.4	5.3	3.1	3.1
Low-income	2.1	2.1	3.7	4.5	1.6	2.4
China	2.0	1.8	3.3	6.0	1.3	4.1
India	2.2	2.1	4.0	3.4	1.8	1.3
Other	2.4	2.7	4.4	2.7	2.0	0.0
Middle-income	2.4	2.4	6.0	5.6	3.5	3.1
Industrial market economies	1.1	0.8	4.7	3.2	3.6	2.4
Europe	0.7	0.2	4.8	2.6	4.1	2.4
Japan	1.0	1.1	10.3	5.4	9.2	4.2
United States	1.4	1.0	3.4	3.1	2.0	2.1
World <sup>a</sup>	1.9	1.9	5.1	3.8	3.1	1.9

a. Includes high-income oil exporters and industrial nonmarket economies.

### *Population growth and private savings*

A country's savings are generated by households, businesses, and the public sector. Corporate and government savings do not seem to be related in any systematic way to variations in population growth; governments can, within limits, use fiscal and monetary measures to change a country's savings rate, irrespective of demographic conditions. Theory suggests, however, that household savings—usually the largest component of domestic savings—should be reduced by the high dependency burdens associated with rapid population growth. At any given level of output per worker, greater numbers of dependents cause consumption to rise, so savings per capita should fall.

Recent empirical studies find only minor support for this view. But many factors account for the weak link between dependency burdens and savings in developing countries; all point to the probability that high fertility is indeed a burden,

do have is harmed. Whether they are restricting investment in their farm, or in their children's education, or in security for their old age, their high fertility contributes to their poverty. But even with fewer children, poor parents might not increase their savings. Instead, they might simply consume a bit more themselves.

A second reason for the apparently weak link between savings and dependency burdens is that banking and credit systems are not well established in developing countries. Poor families (and even the not-so-poor) are unlikely to have financial savings that show up in national accounts; they are more likely to "save" by accumulating land, tools, or other assets. Even if families wanted to save in good times (say, before children are born or after children are old enough to work) and borrow in difficult times, they probably could not without paying a steep price in terms of low real interest rates for saving and high rates for borrowing. A third reason, as explained in Chapter 4, is that

## Box 5.2 Prospects for poverty and population growth, 1980–2000

How would a faster decline in population growth affect the number of poor people in the year 2000? Many other economic, political, and social factors, in addition to population, will influence levels of poverty in the next fifteen years. But some simple assumptions allow illustrative estimates. In a World Bank study, the poor were defined as those with annual per capita incomes below \$135 (in constant 1980 dollars). Based on the experience of many countries, projected income growth in each of forty countries (comprising 80 percent of the population of developing countries) was used to compute the change in income for the poorest groups. The findings were combined with World Bank country projections of population growth to simulate future shifts in income distribution.

The exercise showed that the predicted share of income going to the poorest 40 percent would hardly change, from 14 percent in 1980 to 15 percent in 2000. The estimated number of poor people would fall, however, because of income growth. Using the population growth rate based on a "standard" decline in fertility (described in Chapter 4), the number of poor in these forty countries would fall from 630 million in 1980 to 410 million in 2000. With a "rapid" decline in fertility, the number could be almost 100 million fewer—although at 321 million, it would still exceed the total number of people in Bangladesh, Nigeria, and Pakistan today.

Regional differences are worth empha-

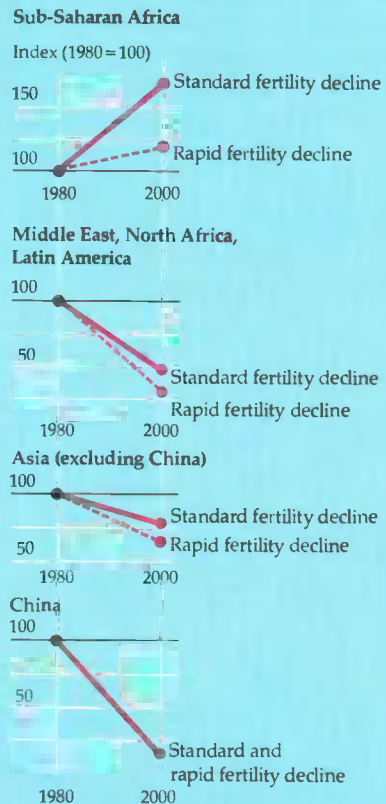
sizing. Economic prospects are so limited in sub-Saharan Africa that all projections point to an increase in poverty. If fertility decline occurs only as in the standard projection—and even that implies considerable decline—the number of people living in poverty at the end of the century will still increase by nearly 70 percent. With a rapid fall in fertility, the number of poor would increase by less than 20 percent—in the circumstances, a substantial achievement.

In South and East Asia, excepting China, economic prospects are better, so that a small reduction in the number of poor can be anticipated even assuming the standard fertility decline. Poverty could be reduced by almost 40 percent, however, with a rapid fall in fertility. Grouping together Latin America, the Middle East, and North Africa—where the poor are fewer than in Asia and in the rest of Africa—rapid fertility decline could help to reduce the number in poverty by 70 percent. As for China, where fertility is already low, the number of poor can be expected to decline by between 80 and 90 percent by the year 2000.

The exercise probably understates the effect of rapid fertility decline in reducing poverty. A faster reduction in fertility is likely to be associated with a narrowing of differences in educational investment by socioeconomic class, and an increase in wages in relation to rents and profits. These imply a more equal distribution of

income than assumed in the projections, and a more rapid elimination of poverty.

Estimated number of poor in the year 2000 under different fertility assumptions, by region



For explanation of assumptions of population projections, see Population Data Supplement.

poor people may see children themselves as a way of "saving" for old age.

These reasons explain why high dependency burdens reduce household savings rates in industrial countries but not in the developing world. In developing countries, though there is no direct link from fertility to household savings, they do become indirectly linked as development proceeds. For example, as more women work in the modern sector, family savings tend to rise and fertility falls; as urbanization proceeds and financial markets improve, monetized savings rise and fertility falls.

### Capital widening

Although rapid population growth does not seem to influence the supply of financial savings, it clearly affects the demand for savings. To maintain income, capital per person (including "human capital," that is, a person's education, health, and skills) must be maintained. And as populations grow, "capital widening" is needed to maintain capital per person. But slower population growth releases investable resources for "capital-deepening"—that is, increasing capital per person. Of course, there may be economies of scale in the provision of schooling, health, and jobs in factories



and on farms. But the evidence on education suggests that capital-widening—spreading resources over more and more people—can be counterproductive.

**SCHOOLING REQUIREMENTS AND CAPITAL WIDENING.** In industrial countries, school-age populations are expected to grow slowly, if at all, over the next two decades (see Figure 5.1). The same is true of those developing countries, such as China, Colombia, and Korea, where fertility has already fallen substantially. In Colombia, the number of school-age children doubled between 1950 and 1970. But it increased only slightly in the 1970s,

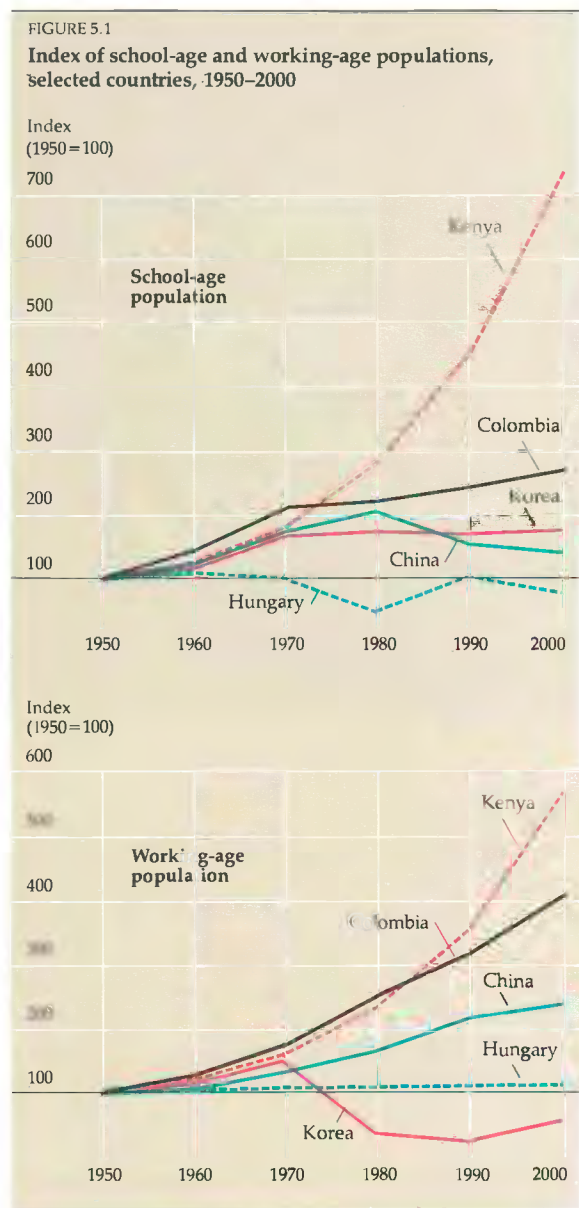
because fertility had started to fall in the late 1960s. This allowed enrollment rates to rise; as the children of poor parents were least likely to have been enrolled before, the poor probably benefited most from the spread of education.

For high-fertility countries, the situation could not be more different. Countries such as Kenya face a doubling or tripling of their school-age population by the end of the century. The main implication is clear. More school-age children require more spending on education, even if the objective is just to maintain current enrollment rates and standards. As most developing countries want to improve their schools quantitatively and qualitatively, they will have to generate more national savings or curtail other investments in, for example, power and transport. If a country is unwilling or unable to make these sacrifices, spending must be spread over a larger group of school children (to the detriment of the quality of education); otherwise a growing number of children have to be excluded.

These awkward choices come after a period of considerable progress. Over the past twenty years, enrollment rates have increased at the primary, secondary, and university levels in almost all developing countries. (The enrollment rate is the number of students enrolled in schools as a percentage of the school-age population.) In some cases, progress has been remarkable. Education tends to spread as per capita income rises, but some of the lowest-income countries—Sri Lanka, Tanzania, Viet Nam—have already achieved, or are fast approaching, universal primary education.

Such achievements have substantially raised the fiscal burden of education. For the developing countries as a group, public spending on education increased from 2.3 percent of GNP in 1960 to 3.9 percent in 1974, and from 11.7 percent to 15.1 percent of government budgets. But the proportion of GNP allocated to education declined slightly over the 1970s, as did the share of education spending in government budgets, especially in South Asia, the Middle East and North Africa, and Latin America.

The budgetary downgrading of education, coupled with slower economic growth, has reduced the quality of education in many developing countries. One study showed that in Latin America public spending per primary student fell by almost 45 percent in real terms between 1970 and 1978. As a share of educational budgets, spending on non-wage items—chalk, maps, textbooks, and so on—fell in eight out of ten Latin American countries. In



twenty-five of fifty-four developing countries surveyed, student-teacher ratios at primary schools have risen; of those twenty-five countries, seventeen were in Africa. Increases in class size often make sense as they raise the productivity of teachers. But in the urban areas of Malawi and Kenya, class size frequently exceeds sixty students. Combined with a lack of teaching materials, large classes make learning difficult.

Developing countries have little scope to reduce educational quality any further. The quality gap between low- and high-income countries is already enormous. Bolivia, El Salvador, Malawi, and the Ivory Coast, for instance, spend less than \$2 a year on classroom materials for each child at primary school—compared with more than \$300 per student in Scandinavian countries. This gap seems to be widening. In 1960, on average, an OECD country spent fourteen times more per primary school student than did any of the thirty-six countries with per capita incomes below \$265 (1975 prices). By 1977 the ratio had risen to 50:1.

These differences in educational quality are clearly reflected in student achievement. Research on twenty-five countries has shown that, after approximately the same number of years in school, schoolchildren in low- and middle-income countries have learned significantly less science than those in industrial countries. Quality can also make a considerable difference within developing countries. In a study of Brazil, Colombia, India, and Thailand, the quality of schools and teachers—measured by a large number of indicators—explained more than 80 percent of the variance in student scores on standardized science tests. The poor are more likely to attend schools of lower quality (and to leave school sooner); so rapid expansion of school systems to accommodate growing populations often means that the differences in skills between rich and poor, though falling in terms of years of schooling, are persisting because of school quality differences.

As lower fertility slows the growth of the school-age population, it can ease the pressures on the education system. In Egypt, for example, if fertility does not fall, the number of children of primary school age would double by the end of the century. With the standard decline in fertility described in Chapter 4, the number would increase by 65 percent; with the rapid decline, by only 20 percent. The difference between a standard decline and a rapid one would be about 2 million fewer children a year enrolled in primary schools in the years 2000 to 2015. Fewer births in the early 1980s due to a

rapid decline in fertility would decrease the size of the age group eligible for Egypt's secondary schools and universities starting in the late 1990s.

Less rapidly growing enrollment produces considerable financial savings; these can be used to improve school quality. One projection, for Malawi up to 2015, started with the assumption that recurrent costs (essentially teachers' salaries) were held constant at their 1980 level of \$12.50 per student. With unchanged fertility, the budget for primary education would double about every fifteen years, even if nothing were done to improve the coverage and quality of primary schools. Thus the education budget's share in GDP would increase from 0.7 percent in 1980 to about 1 percent in 1995 if the economy of Malawi were to grow at about 3 percent a year. The financial savings from lower fertility would accrue slowly at first, but build up considerably (see Table 5.2). Costs excluded from the projections—for instance, outlays for teachers' training and school buildings—would also fall and thus boost these savings.

With the money saved by lower fertility, the Malawi government could afford to enroll the country's total school-age population in 2005 for less than it would cost to enroll 65 percent if fertility did not fall. If the government chose to maintain a 65 percent enrollment rate, its spending per pupil could be doubled in real terms by 2015 without increasing the share of the primary school bud-

TABLE 5.2  
**Malawi: projected primary-school costs under alternative fertility and enrollment assumptions, 1980–2015**  
(millions of 1980 dollars)

Year	Standard fertility decline		Rapid fertility decline		Saving with rapid fertility decline (percent) <sup>a</sup>
	(1)	(2)	(3)	(4)	
1980	9.8	9.8	9.8	9.8	n.a.
1995	19.2	26.9	17.9	25.1	7
2000	22.5	34.6	17.6	27.1	22
2005	26.6	40.9	17.6	27.0	34
2010	31.0	47.8	17.3	26.6	44
2015	35.3	54.3	15.3	23.5	57

n.a. Not applicable.

Note: Columns 1 and 3 assume a constant enrollment rate of 65 percent. Columns 2 and 4 assume the enrollment rate increases and is 100 percent by the year 2000.

a. The percentage cost savings are the same under both assumptions regarding enrollment rates. Absolute cost savings are greater under the assumption of universal primary education by the year 2000.

get in GDP. Alternatively, all or part of the savings could be used to increase spending per pupil or to increase the enrollment rate in Malawi's secondary schools which in 1980 stood at only 4 percent. The returns to using the resources saved on account of lower population growth for improving school quality are likely to be higher than the returns to forced rapid expansion of the system if population growth does not slow. But improving quality will be difficult until a larger share of the population has access to basic education, which itself is delayed if the numbers of school-age children are constantly increasing.

The potential for cutting educational costs through lower fertility is obviously largest for those countries with the highest fertility rates. Four African countries—Burundi, Ethiopia, Malawi, Zimbabwe—could save between 50 and 60 percent of their educational spending by 2015 (see Table 5.3), whereas a rapid fertility decline would reduce educational costs by only 5 percent in Colombia, by 1 percent in Korea, and by even less in China, where there is virtually no difference between the rapid and standard fertility assumptions. But these lower-fertility countries have already gained considerably from slower population growth. For example, if Korea's fertility rate had remained at its 1960 level, the number of primary school-age children in 1980 would have been about one-third (2 million) larger than it was. Applying actual 1980 costs per student (\$300) to that difference gives a saving in a single year of \$600 million, about 1 percent of Korea's GDP.

GROWTH OF LABOR FORCE AND CAPITAL WIDENING. Keeping up with schooling needs is only one way whereby rapid population growth contributes to

TABLE 5.3  
**Potential savings in primary-school costs under rapid fertility decline, selected countries, 2000 and 2015**

Country	Total fertility rate (1981)	Cost savings (percent) <sup>a</sup>	
		2000	2015
Korea, Rep. of	3.0	12	1
Colombia	3.7	23	5
Egypt	4.8	27	23
Burundi	6.5	26	56
Ethiopia	6.5	25	60
Kenya	8.0	22	50
Zimbabwe	8.0	19	48

a. Compared with standard fertility assumption.

capital widening. For most countries the same is true of jobs. In contrast to school-age populations, whose rate of growth starts to slow five or six years after a decline in fertility, the growth of working-age populations is more or less fixed for fifteen to twenty years. People born in 1980–84 will be entering the labor force in 2000 and will still be there almost halfway through the twenty-first century.

High-fertility countries face large increases in their labor forces. As an example, Nigeria's high fertility in the 1970s guarantees that its working-age population will double by the end of this century. Kenya can expect an even larger increase. Where fertility has fallen in the past two decades, the increases will be smaller (see Figure 5.1). China will experience a rise of no more than 45 percent. Korea's working-age population has already fallen substantially and will change little between now and the year 2000. In all these countries the actual labor force—people who are working or looking for jobs—will grow even faster if, for example, more women start looking for paid employment.

In countries with growing labor forces, the stock of capital (both human and physical) must continually increase just to maintain capital per worker and current productivity. Unless this happens, each worker will produce less using the reduced land and capital each has to work with. Productivity, and thus incomes, will then stagnate or even fall. Wages will fall in relation to profits and rents, and thus increase income inequalities—another example of how rapid population growth harms the poor.

For incomes to rise, investment needs to grow faster than the labor force, to ensure capital deepening. Capital deepening involves a growing demand for spending on education, health, roads, energy, farm machinery, ports, factories, and so forth. These requirements have to be traded off against extra consumption. Of course, if educational levels are rising quickly, rapid restocking of the labor force with young, better-educated people can be an advantage. But, as shown above, it is also difficult to increase educational spending per child if population growth is rapid.

Even when developing countries manage to raise investment in line with the growth in their labor force, the contrasts with developed countries are striking. The gap in educational quality has already been described. Investment in physical capital per new worker is also much larger in industrial countries because their labor-force growth is slower and their GDP per capita is so much higher. Even a middle-income country such



as Korea, with a high investment ratio of 31 percent in 1980, could provide only \$30,000 of gross investment per new worker, compared with \$189,000 in the United States, which had an investment ratio of only 18 percent. (The investment ratio is gross domestic investment as a percentage of gross domestic product.) If all investment in countries such as Bangladesh, Ethiopia, Nepal, and Rwanda had been allocated to potential new workers during 1980, each person would have had less than \$1,700 invested on his or her behalf (see Table 5.4). At the other extreme, new workers in Japan would have had about \$535,000 of gross investment available. Countries with the lowest absolute levels of investment per potential new worker tend to be those also facing the fastest growth in their working-age populations. Just to maintain the current small amount of investment per potential new worker, they will have to increase their investment rapidly. In contrast, developed countries can increase the capital available to each potential new worker in 2000 even if investment grows by less than 1 percent a year.

Rapid growth in the labor force has two other effects.

- It is likely to exacerbate income inequalities, particularly if many new young workers have little education. When a large proportion of workers are young and inexperienced, their productivity tends to be lower. Except for those who have more education than older workers, their starting wages will tend to be lower, and they must compete with each other. Relatively few will receive employer training to upgrade their skills. Over time, the weight of numbers of the unskilled will hold down their wages in relation to those of skilled workers. A World Bank study of what determines income growth among countries found that as overall income rises, the average contribution of individual workers without education falls—uneducated workers contribute (and probably earn) relatively less than they once did.

- It increases various forms of unemployment. Although population growth has had a relatively small effect on open unemployment in developing countries, this fact does not demonstrate any demographic stimulus to job creation. It simply indicates that unemployment is not a feasible option for most people. Open unemployment is typically found most among educated urban

TABLE 5.4

**Gross domestic investment per potential new worker, selected countries, 1980**

Country group	Investment ratio <sup>a</sup> (percent)	Gross domestic investment (billions of dollars)	Increase in working-age population <sup>b</sup> 1979-80 (millions)	Gross domestic investment per potential new worker (thousands of 1980 dollars)	Projected increase in working-age population 1980-2000 (percent)
<b>Developing countries</b>					
Bangladesh	17	1.90	1.70	1.09	74
Ethiopia	10	0.37	0.24	1.53	76
Nepal	14	0.26	0.21	1.26	78
Rwanda	16	0.18	0.11	1.66	99
Kenya	22	1.31	0.28	4.70	134
Egypt, Arab Rep.	31	7.12	0.80	8.96	68
Thailand	27	9.03	0.65	10.66	73
Colombia	21	6.21	0.62	10.10	66
Korea, Rep. of	31	18.06	0.61	29.85	45
Brazil	22	52.35	1.30	40.36	65
<b>Industrialized countries</b>					
Japan	32	332.80	0.62	535.04	11
Australia	24	35.53	0.16	219.35	19
France	23	149.94	0.33	461.34	13
Germany	25	204.79	0.43	481.33	1
United States	18	465.68	2.46	188.99	15

Note: Countries are listed in ascending order of their GNP per capita in 1982.

a. Gross domestic investment as percentage of gross domestic product.

b. Age cohort 15-64 years.

youths, who are presumably able to draw on family support while seeking work commensurate with their qualifications or expectations. Many others are underemployed: “invisible underemployment” (including part-time and low-productivity workers whose skills would permit higher earnings if better jobs were available) is estimated to range from 20 percent in Latin America to about 40 percent in Africa. In urban areas of most poor countries, occupations that require little or no capital—handicraft production, hawking, and personal services of all sorts—are highly visible areas of the so-called informal sector. These occupations have the advantage of using scarce financial capital efficiently, but the incomes they produce are often extremely low.

**STRUCTURAL TRANSFORMATION OF THE LABOR FORCE.** As shown in Chapter 4, both urban and rural populations will increase rapidly into the next century in the low-income countries of Asia and Africa. Thus, while the general concern with the provision of productive employment for urban dwellers is well founded, many countries will also face the task of absorbing considerably more workers into the rural economy. This double challenge differs from the historical experience of today’s industrialized countries. Their economic growth was helped by a massive shift of labor from agriculture, where the amount of capital per worker and average productivity was relatively low, to industry and services, where they were relatively

high. The two principal reasons for this structural transformation of the labor force are well known:

- As incomes rise, people spend a smaller proportion on unprocessed agricultural produce and a larger proportion on industrial products and services.
- Increases in agricultural productivity—made possible by technological innovations and accumulated investment—allow output to grow with a constant or even declining farm labor force.

As average incomes increase in today’s developing countries, and as population growth rates slow, the number of workers in agriculture should eventually decline. In some upper-middle-income countries in Latin America, including Argentina, Chile, Uruguay, and Venezuela, already less than 20 percent of the labor force is employed in agriculture. But the transfer of labor out of agriculture has proceeded much more slowly in much of low-income South Asia and sub-Saharan Africa. There are two reasons: their high rates of growth of the total labor force and their low initial shares in modern sector employment.

In 1980 the share of the labor force in agriculture averaged 73 percent in low-income countries (excluding China and India); in most countries of sub-Saharan Africa it was between 80 and 90 percent. During the 1970s the total labor force in these countries grew at 2.3 percent a year. The rate of growth will increase to 3 percent a year between 1980 and 2000. The effects on the future growth of the agricultural labor force can be illustrated with some hypothetical calculations.

Figure 5.2 portrays a country in which 70 percent of the labor force is in agriculture and in which nonagricultural employment is growing at 4 percent a year. It shows, for different rates of growth of the total labor force, the time required for the size of the agricultural labor force to start to decline in absolute numbers. For example, if it is assumed that the annual growth of the total labor force is 2.5 percent (which, combined with a 4 percent growth in nonagricultural employment, is a fairly typical combination in low-income countries), the agricultural labor force would continue to grow in absolute size (though declining slowly as a share of the total) for about fifty years (point x). If the total labor force were to grow by 3 percent a year instead, the time required for the agricultural labor force to start to decline would nearly double to ninety-five years (point y). Although this example oversimplifies—for instance, it does not admit the possibility of massive urban unemployment—it does seem clear that the size of the agricultural



labor force in most of today's low-income countries will go on increasing well into the twenty-first century.

In western Europe and Japan, by contrast, the number of farm workers began to fall when the labor force was still largely agrarian, so there were never any significant increases in the size of the agricultural labor force. In Japan, for example, the share of agriculture in the labor force in the mid-1880s was about 75 percent—much the same as in today's low-income countries, and nonagricultural employment grew at between 2 and 3.5 percent a year in the late 1800s and early 1900s. In these two respects Japan was similar to many low-income countries today. But the total labor force was growing at less than 1 percent a year, much slower than in developing countries today (see Figure 5.2). So only modest rises in nonagricultural employment were necessary to absorb the rise in the rural work force. Between 1883–87 and 1913–17, the share of the labor force in agriculture fell by twenty percentage points and the absolute number of farm workers fell by some 1 million.

Kenya provides a dramatic contrast with the Japanese case. Only about 14 percent of the Kenyan labor force is in wage employment in the "modern" economy and about half of them are in the public sector. Between 1972 and 1980 employment in the modern sector grew at 4.3 percent a year, higher than in Japan in the late nineteenth century but somewhat slower than the growth of GDP (4.9 percent). But the rate of growth of the total labor force was very rapid—3.5 percent. There was some shift of the labor force into the modern economy, since growth in modern sector employment was faster than in the total labor force. But the shift was small. Nonwage employment—mainly in agricul-

ture—absorbed more than 80 percent of the increase in the labor force.

Agricultural output and jobs must continue to grow rapidly in Kenya: the effective demand for food is rising at about 4 percent a year, so that domestic production—or other agricultural exports to pay for food imports—must grow at least at the same pace to avoid draining foreign exchange from other sectors (if constant terms of trade are assumed). And the rest of the economy has only a limited capacity to absorb labor. The public sector accounted for about two-thirds of the growth in wage employment during 1972–80—the number of schoolteachers rose by more than the increase in manufacturing workers—but its growth is constrained by fiscal limits. Industry is relatively small and capital intensive, so its work force is unlikely to expand much.

These constraints are highlighted by the projections in Table 5.5. In the "worst" case—essentially a continuation of recent trends, with the labor force growing at 3.5 percent a year and nonagricultural employment at 4 percent—Kenya's agricultural work force would still be increasing in absolute size even 100 years from now (see also Figure 5.2). In the "best" case, which assumes the same growth in nonagricultural employment but slower growth in the labor force after 2000 (implying a decline in fertility starting in the mid-1980s), structural transformation proceeds at a faster pace. Even so, agriculture must absorb more than 70 percent of the growth in the labor force for the rest of this century. It is only after 2025 that the number of workers in agriculture starts to decline. In the meantime, how to absorb these extra farm workers productively is a critical issue in Kenya and in many other countries in sub-Saharan Africa and South Asia.

TABLE 5.5

**Kenya: projections of employment by sector, under two scenarios, 1976–2050**  
(millions of workers)

Employment sector <sup>a</sup>	1976	2000	2025	2050
Nonagricultural employment <sup>b</sup>	1.2	3.0	8.0	21.8
Agricultural employment				
"Worst" case <sup>c</sup>	3.8	9.9	24.1	56.9
"Best" case <sup>d</sup>	3.8	9.9	12.4	4.5

a. Unemployment held constant in all years and in both cases (about 1.2 million workers).

b. Increases at 4 percent a year in both scenarios.

c. Labor force grows at a constant 3.5 percent a year.

d. Growth of labor force slows from 3.5 percent a year in 1976–2000, to 2.5 percent a year in 2001–10, to 1.5 percent a year in 2011–25, and to 1 percent a year in 2026–50.

*Efficiency: allocating limited capital*

Capital deepening (and associated absorption of labor into the modern sector) is not the only contributor to economic growth. Last year's *World Development Report* highlighted the importance of making better use of existing resources, as well as of innovation and entrepreneurship. Promoting efficiency often requires policy reform. For example, many developing countries have a history of subsidizing capital; subsidies have discouraged labor-intensive production and led to inefficient use of scarce capital. Even with reform, efficiency may not come easily; many technological innovations available to developing countries are labor-

saving because they come from the capital-rich industrial world. But efficiency is even harder to achieve when population growth is rapid. For example, social and political pressure to employ young people has undoubtedly contributed to the large government sector in many developing countries, and in some countries to regulations designed to stop private employers from reducing their work force. Selective government concern for educated young people in urban areas has led to policies such as Egypt's that guarantee employment to all university graduates. As well as being inefficient, this policy hurts people who are not educated because scarce public spending is

## Constraints on agricultural production

Food production in developing countries has increased rapidly in recent decades but has still just kept pace with population growth (see Table 5.6); in the 1970s it failed to do so in many low-income countries, including Bangladesh, Nepal, and twenty-seven of thirty-nine countries in sub-Saharan Africa. Other African countries—including Kenya, Malawi, Rwanda, and Upper Volta—managed only a slight increase in per capita food production. The output of food in China and India has also exceeded population growth since the mid-1960s, but by only a narrow margin.

In the past, increases in food production were mainly due to bringing more land under cultivation: this is still the case in sub-Saharan Africa and in parts of Latin America. About 25 percent of the world's land—some 3.4 billion hectares—is thought to be of agricultural potential. Of this, only about 1.4 billion hectares (40 percent) is being cultivated, so there is little evidence of a global land shortage (see Box 5.3).

For developing countries as a whole, however, increased acreage accounted for less than one-fifth of the growth in agricultural production over the past two decades. In part this is because land reclamation is often more costly than intensifying use of existing land; in part it is because further expansion of the land frontier is constrained in many parts of the world. In sub-Saharan Africa, for example, the development of vast areas is precluded because of such diseases as river blindness (onchocerciasis) and sleeping sickness (trypanosomiasis). The latter renders livestock production virtually impossible on some 10 million square kilometers of higher rainfall areas, 45 percent of all the land in sub-Saharan Africa. Major campaigns have been undertaken to free parts of the Sudanese savanna country from sleeping sickness, but it has not always been possible to prevent a resurgence of the disease. Moreover, insecticides used to control tsetse flies, which spread sleeping sickness, have had undesirable effects on the environment. For that and other reasons, some countries in Africa are reaching the limits of their land (see Box 8.4 in Chapter 8).

In Asia, too, further expansion of agricultural land does not appear to be an option for several countries. For example, in India between 1953–54 and 1971–72, a 66 percent increase in the number of rural households was accompanied by only a 2 percent increase in the cultivated area. As a result, the number of marginal holdings of less than one

TABLE 5.6  
Growth rates of food output by region, 1960–80  
(average annual percentage change)

Region or country group	Total		Per capita	
	1960–70	1970–80	1960–70	1970–80
Developing countries	2.9	2.8	0.4	0.4
Low-income	2.6	2.2	0.2	-0.3
Middle-income	3.2	3.3	0.7	0.9
Africa	2.6	1.6	0.1	-1.1
Middle East	2.6	2.9	0.1	0.2
Latin America				
America	3.6	3.3	0.1	0.6
Southeast Asia <sup>a</sup>	2.8	3.8	0.3	1.4
South Asia	2.6	2.2	0.1	0.0
Southern Europe	3.2	3.5	1.8	1.9
Industrial market economies	2.3	2.0	1.3	1.1
Nonmarket industrial economies	3.2	1.7	2.2	0.9
World	2.7	2.3	0.8	0.5

Note: Production data are weighted by world export unit prices. Growth rates for decades are based on midpoints of five-year averages except that 1970 is the average for 1969–71.

a. Excludes China.

Sources: FAO; World Bank, 1982b.

diverted for the benefit of those who are relatively well off. Youth unemployment may also contribute to crime and instability and the resulting large amount of service employment as police and private guards in some cities of developing countries. None of these, of course, adds to national income. Crime is tied primarily to poverty and social disorder, but tends to increase wherever there are large cohorts of young people who are unemployed (including in developed countries).

### Box 5.3 Food supplies for a growing world population

The food crisis of 1972-74 created an atmosphere of impending disaster and a renewed interest in Malthusian pessimism. More recent views point to the success of technological change in agriculture and to the conclusion that the world as a whole is capable of producing enough food for future generations well into the next century. The main issue is not the worldwide availability of food, but the capacity of nations, groups within nations, and individuals to obtain enough food for a healthy diet.

In most countries, particularly low-income ones, the staple food is cereals or coarse grains; they account for about half of total food consumption in developing countries. Over the past thirty years global grain production has doubled and, according to the FAO report *Agriculture: Toward 2000*, could double again by the year 2000. An American study, *The Global 2000 Report to the President*, agrees with this assessment. A doubling of world grain production over twenty years or so amounts to an annual growth rate of about 3.5 percent.

On the demand side, earlier projections indicated that demand for cereals and grains for both human consumption and livestock feed would rise at between 3.0 and 3.5 percent a year, depending on assumptions for population and income growth. More recent projections suggest a much slower growth of global demand. For example, the International Wheat Council's recent *Long-Term Grain Outlook* puts global cereal demand up 50 percent by 2000, equivalent to a rise of about 2.3 percent a year; a report published by the US Department of Agriculture came to similar conclusions. Both of these assessments included projections of grain that would be fed to animals. A World Bank study projects an average growth in the demand for grains of about 2.6 percent a year.

This optimism for the global situation stands in sharp contrast to the assessments for groups of countries, individual countries, and households. Various studies suggest that the gap between domestic supply and demand is projected to

widen in the developing countries, particularly because of continued rapid growth in population and income. Centrally planned economies may also continue to have a shortfall. Production in the industrial world is projected to rise, albeit more slowly than in the past, while the growth in its demand is projected to level out.

On a national and household basis, the outlook is even more varied. A number of industrial countries do not produce enough grain or food to satisfy domestic demand. But their national food security is assured because the value of their non-food exports is usually more than adequate to finance food imports. These countries also have effective methods of distributing food, though their poorest people may be vulnerable. For some of the developing countries the situation is less secure. Estimates by the FAO suggest that in the year 2000 twenty-nine developing countries may be unable to feed themselves from their own land with inputs of fertilizers, seeds, and so on at an "intermediate" level of technology (a basic package of fertilizers, improved seed, and simple conservation measures). Many of these countries are in Africa, where technology is probably below the "intermediate" level (see also Box 8.4). Outside Africa, the group includes Afghanistan, Bangladesh, El Salvador, Haiti, and Jordan.

Increasing domestic production of food is not the only solution. Many developing countries with a chronic food deficit have other options, the main one being to increase exports of nonfood goods so as to finance food imports. For those countries with transitory food deficits, a combination of more exports and better arrangements for storing food may be the answer. For some countries in Africa, to avert a food crisis will require external aid—to finance food imports in the short run and to expand investment in developing long-run potential for food and nonfood production.

Ultimately it is not countries but individuals who suffer from a shortage of food—not because of fluctuations in

national production but because of higher food prices, which they cannot afford, or because of inadequate arrangements for marketing food. Their diet will improve only when their general economic state does.

Some research on the global food situation has looked well beyond the end of this century. Bernard Gilland, for example, estimates the maximum global output of food to be 7,500 million tons grain-equivalent (tge) a year. This figure was obtained by multiplying a "realistic" maximum yield of 5 tge per hectare (from the present average of 2 tge per hectare) by 1.5 billion hectares, allowing for a slight increase over the estimated 1.4 billion hectares of land currently used for food production. An additional 500 tge was added for rangeland and marine production. Presently, gross consumption of plant energy for all purposes—food, seed, and animal feed—ranges from 3,000 calories per person per day in South Asia to 15,000 calories in North America, Australia, New Zealand, and France. (Consumption of meat raises consumption of "plant energy" because the conversion of grain to meat through feeding of livestock is inefficient compared with direct consumption of grain.) Gilland selects a "completely satisfactory" average daily per capita allowance of 9,000 calories of "plant energy" (implying some meat consumption), and concludes that the earth has the capacity to support about 7.5 billion people. This population will probably be reached in the second decade of the next century. On a daily per capita allowance of 6,000 calories of plant energy—the current world average—the earth would be capable of supporting about 11.4 billion persons. That number is roughly equal to the projected world stationary population. Cultivated land could be increased more, and land-saving technological advances, especially deriving from genetic engineering, would transform the outlook, allowing for better diets even as population grows. But there are also downside risks (new crop diseases, soil erosion, and climate change).



acre increased from 15.4 million to 35.6 million and their average size fell from 0.27 to 0.14 acres. To take another example, the average land-man ratio in Bangladesh is estimated to have declined from 0.40 acres in 1960–61 to 0.29 acres in 1979–80. More people have been absorbed into agriculture, but incomes have risen little if at all. More people are probably having to earn a living as landless laborers. As their numbers have increased, their wages have tended to fall in relation to those who own (or even rent) land. The agricultural system has adapted, but in ways that have probably increased income inequalities in the countryside.

Another constraint on the use of potential agricultural land is shortage of water. In many developing countries, any large expansion of agricultural production would require some form of irrigation. Worldwide, the area under irrigation expanded by almost 6 million hectares a year during the 1960s. India has shown the most dramatic growth, with the irrigated area increasing from 28 million hectares to 55 million hectares over the past two decades, an average of more than 1 million hectares a year. In the 1970s, however, worldwide expansion of irrigation slowed to just over 5 million hectares a year. This slowdown occurred because some countries, such as Pakistan, started to run out of land that can be irrigated at an acceptable cost.

Shortage of water in many parts of India, in the Nile Basin, in Brazil, and in most of the developing countries is constraining irrigation development, and water transfer projects are being planned on an even bigger scale than those recently built in Pakistan. Countries are also putting more emphasis on groundwater development, on the combined use of ground and surface waters, on water economy, and on more advanced methods of water management. Poor water management is considered by many specialists to be the most important single constraint to irrigated crop production. Bilateral and multinational agencies are now trying to arrest the decline in management standards, and an International Irrigation Management Institute has recently been established to promote better use of water. The challenge will, however, remain formidable, especially in some countries of sub-Saharan Africa, where little or no irrigation has been used in the past. This is particularly true for the Sahelian countries, where progress has been limited mainly because of high construction costs (\$10,000 to \$15,000 per hectare compared with \$2,000 to \$5,000 in Asia), low farmer response, and poor project management.

### *Easing constraints*

Multiple cropping—more than one crop a year from the same piece of land—is a typical way for societies to cope with rising populations. In Asia, where the proportion of potential land under cultivation was an estimated 78 percent in 1975, about 7 percent of the cultivated land is cropped more than once. For some Asian countries the proportion is much greater. In the late 1960s 52 percent of cultivated land was cropped more than once in Korea. In Bangladesh in the late 1970s, 43 percent of the land was cropped more than once.

Multiple cropping increases production and uses more labor, so that the chief resource required to feed the growing populations of developing countries is provided by the people themselves. Farm studies in Africa and Asia show that, on average, a 10 percent increase in farming intensity (defined as the percentage of time in the rotation cycle that is devoted to cropping) involves a 3 to 4 percent increase in the amount of labor per hectare. Labor input per hectare increases because, under intensive farming systems, the extra hours required for land preparation, sowing, weeding, and plant protection more than offset the reduction of hours—essentially for land clearing—associated with shorter fallow periods.

But the combined benefits of more employment and more food do not come automatically. Without modern technical packages—including purchased inputs such as fertilizers and improved seeds—and effective price incentives, the amount of labor used can increase faster than output. Less fertile land may be brought under cultivation; good land may be given less time to regain its fertility. Research into farming systems and increased use of agricultural extension services can help ensure that new farming methods are compatible with available resources, including labor. But population pressure is likely to continue. In parts of Africa, and in China, Bangladesh, and Java in Indonesia, population pressure has already forced people to work harder just to maintain income in traditional agriculture.

In most developing countries, however, labor productivity has been maintained. To forestall diminishing returns to labor, intensification of land use has usually been accompanied by better farming methods, the use of fertilizers, investments in irrigation and drainage, and mechanization. However, such measures are possible only where rainfall is favorable—or where water is available for irrigation—and where topography and soils do not

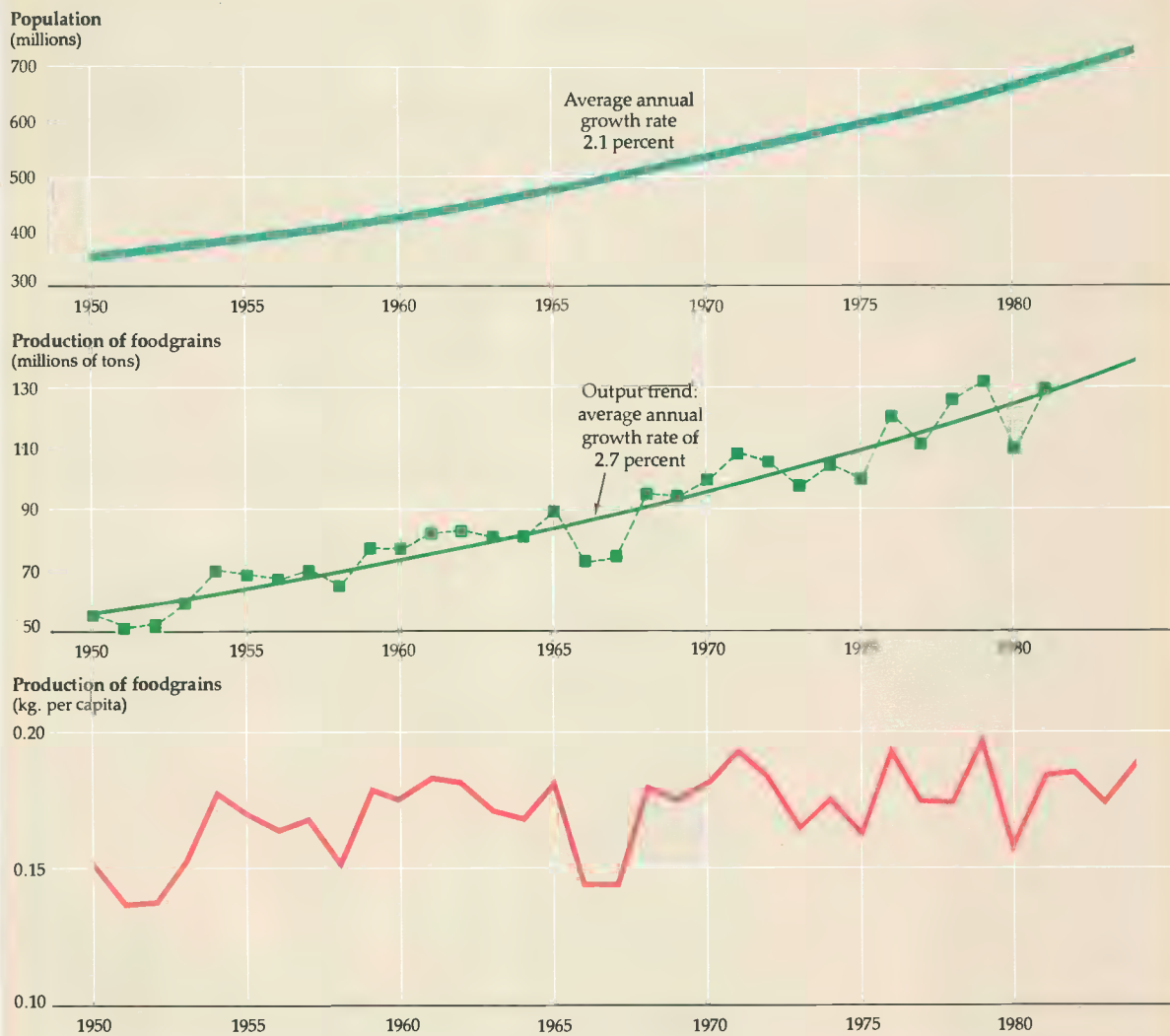
impose constraints that cannot be eased at acceptable costs.

Higher population density, by permitting economies of scale in the provision of infrastructure and services, can sometimes help to induce improvements in agriculture. In the United States, for instance, rising population densities stimulated the development of the transport system during the nineteenth century. An improved transport system, in turn, greatly facilitated the growth of agriculture by lowering transport costs and by raising the farmgate prices of agricultural products. But the potential benefits to be gained from higher population densities are not always realized. In

rural Bangladesh—one of the most crowded areas in the world—transport, marketing and storage facilities, as well as extension services, are all inadequate.

From one point of view, it is no small achievement to sustain an increase in population on the scale that has occurred, and continues to occur, in many developing countries. But keeping the production of food up with (or even ahead of) growth in population is no guarantee that people have a healthy diet. Where incomes are low and unequally distributed, and increases in food production are just barely ahead of increases in population size, poor people may not be able to afford the

FIGURE 5.3  
Foodgrains and population in India, 1950–83



Years shown are end years for the agricultural season. Data for 1983–84 are estimates.  
Sources: World Bank data; adapted from Cassen, 1978.

food they need. Although the amount of labor used in farming has risen in most developing countries, many families have had little or no increase in their income. They are particularly vulnerable when harvests are poor. As Figure 5.3 shows, India has managed to expand its food production faster than its population has grown. But output per person has varied considerably, and in bad years when food prices have risen, the landless poor probably went hungry.

Most developing countries still have potential for yield increases (see Table 5.7). But in some land-scarce countries—for instance, Egypt, China, and Korea—yields are already high. Paddy yields in Egypt in 1979–81 averaged 5.6 tons per hectare,

matching what was achieved in Japan. Because these countries also use land intensively, they need larger inputs of fertilizer to increase food production. A second group of countries are likely to go on importing food indefinitely because of constraints on land, irrigation, and so on. For a third group, although the constraints appear less severe, the process of agricultural modernization may take several decades. In the meantime, they may need to increase their food imports.

### Population and the environment

Rapid population growth can contribute to environmental damage, especially when combined

TABLE 5.7  
Cereal yields and fertilizer use, selected countries, 1969–81

Country group	All cereal yields (tons per hectare of harvested area)		Fertilizer use (kilograms per hectare of harvested area)	
	1969–71	1979–81	1969–71	1978–80
<b>Industrialized countries</b>				
United States	3.50	4.20	172.4	192.5
Denmark	3.85	4.02	331.0	331.0
Netherlands	4.02	5.69	868.0	1,121.5
Japan	5.04	5.27	426.2	532.6
<b>Developing countries</b>				
<b>Africa</b>				
Burundi	1.04	0.99	0.6	1.1
Cameroon	0.89	0.89	7.9	11.6
Egypt, Arab Rep.	3.85	4.01	115.0	188.5
Kenya	1.47	1.50	18.4	18.4
Malawi	1.00	1.18	6.6	16.1
Zimbabwe	1.08	1.36	54.3	64.2
Tanzania	0.78	0.70	3.3	6.1
Zambia	0.76	0.74	25.4	47.5
<b>Asia</b>				
Bangladesh	1.66	1.96	10.7	31.9
Sri Lanka	2.40	2.42	53.3	70.2
India	1.11	1.34	12.5	31.7
Korea, Rep. of	3.50	4.77	193.1	354.5
Malaysia	2.39	2.82	45.3	102.3
Pakistan	1.21	1.61	23.1	61.2
Philippines	1.30	1.59	23.5	30.7
Thailand	2.01	1.94	9.9	20.1
<b>Latin America</b>				
Argentina	1.71	2.20	3.3	4.4
Brazil	1.33	1.50	24.0	72.6
Colombia	1.72	2.46	43.0	69.0
Chile	1.86	2.12	106.2	84.2
Costa Rica	1.55	2.25	141.9	177.9
Ecuador	1.04	1.61	17.5	48.5
El Salvador	1.57	1.72	104.2	105.3
Guatemala	1.12	1.51	25.8	65.2
Mexico	1.52	2.11	38.7	79.8

Note: Harvested area covers all cropped areas including tree crops.  
Sources: FAO, 1982; World Bank.

with certain nondemographic factors. For example, an unequal distribution of farmland, by restricting access to better soils, can help to push growing numbers of people onto ecologically sensitive areas—erosion-prone hillsides, semiarid savannas, and tropical forests. One example is the migration to the Amazon rainforests from rural areas of northeastern Brazil, where 6 percent of the landholdings account for more than 70 percent of the land area. Social changes can also bring ecological threats: in Kenya and Uganda pastoral groups, whose political power was destroyed under colonial rule, have seen their closed system of communal management converted into open access to their land. With added population growth, overgrazing and severe environmental damage have followed. Population pressure is not always the main culprit, but it almost always exacerbates the problem.

Of course, the environmental problems of the developing countries are not confined to the countryside. Industrialization and urbanization have already led to severe air, water, and noise pollution in some cities. Although such pollution is a hazard to public health, it does not pose as immediate a threat to the economic life of low-income countries as does deforestation and desertification. In dry countries, these two threats are closely linked.

### *Deforestation*

Forests are central to the economic and ecological life of many developing countries. They help to control floods and thus protect roads in mountainous and wet areas. Floods and landslides have become serious problems in steep, deforested

areas such as in Nepal (see Box 5.4). Forests also protect power production from hydroelectric schemes. When watersheds are cleared, dams often start to silt up. Less electricity can be generated (because less water can flow through the turbines); thus the economic life of the investment is reduced. For example, the useful life of the Ambuklao Dam in the Philippines has been cut from sixty to thirty-two years because of deforestation.

Satisfying the demand for firewood is a major cause of deforestation, particularly in the drier and higher regions where trees grow slowly. To meet their daily energy needs, an estimated 1.3 billion people must cut firewood faster than it can be replaced by natural growth. Unfortunately, those who are exhausting the forest seldom recognize what they are doing. The depletion becomes apparent only when obtaining adequate supplies requires more physical effort or greater expense. In the Gambia and Tanzania population growth has made wood so scarce that each household spends 250 to 300 worker-days a year gathering the wood it needs. In Addis Ababa, Ethiopia, the price of wood increased tenfold during the 1970s and now claims up to 20 percent of household income.

The scarcity of wood has profound implications for everyday life in developing countries. When there is not enough fuel to heat food and boil water, diseases spread more rapidly. In China more than 70 million rural households—about 350 million people—suffer serious fuel shortages for up to six months a year when crop residues are exhausted and wood is unavailable in deforested areas. In much of West Africa, families traditionally cooked two meals a day. Now, because wood

## **Box 5.4 Reclaiming the Himalayan watersheds**

The Ganges river, which flows through India and Bangladesh, floods every year, causing millions of dollars of damage and incalculable human suffering. But the floods and the resulting damage are much worse than they need be. In the mountainous watersheds of northern India and Nepal, population growth has led to severe deforestation, which has caused the area's heavy rains to run off rather than soak into the soil. In the lowland areas surrounding the Ganges, population growth and competition for land

has forced many people to live too close to the river, in the path of the annual floods. As testimony to the effects of population growth, the severity of flooding has increased exponentially over the past twenty years, even though the annual rainfall has hardly changed.

To help combat the flooding, the World Bank is funding a pilot project in the Indian state of Uttar Pradesh to develop nine small watersheds covering 312,000 hectares. By planting trees over a wide area the project will attempt to reclaim

denuded hillsides. It will also encourage stall-feeding of livestock to help alleviate the damage done by roaming animals. Farmland will be terraced to slow down erosion. At the same time, the governments of Bangladesh, India, and Nepal are pursuing policies to reduce rapid population growth, a contributing factor to deforestation as well as high population density in the flood-prone areas (see Chapter 8).

is so scarce, they can do so only once a day or once every other day. A more specific example is that of soybeans in Upper Volta. They are a new crop, are exceptionally nutritious, and have grown well, but they are not popular because they have to be cooked a long time. Similar experiences have been reported in Haiti.

Managed village woodlots, fuelwood plantations, or more efficient wood stoves could do much to ease shortages. For example, a well-managed woodlot planted with fast-growing trees can yield as much as twenty cubic meters of wood per hectare annually, six times the yield of an unmanaged natural forest. However, these and other measures are not easy to introduce. They require local testing and adaptation, large numbers of trained staff, and adequate economic and institutional incentives. But the returns from forestry development can be high. In Ethiopia, where fuelwood shortages have become critical in some regions, estimated rates of return on investments in rural forestry are on the order of 23 percent.

Another major cause of deforestation is the expansion of agriculture. According to the FAO, agricultural growth involves clearing more than 11 million hectares of forest a year, primarily in response to population pressures. Unless these marginal lands are given much commercial attention—fertilizers, irrigation, and so on—they soon tend to become eroded and infertile. When this happens the settlers clear more forest, a destructive and unsustainable process. Fertilizers are often an uneconomic remedy, being expensive and ineffective in the soil and rainfall conditions of many tropical areas.

### *Desertification*

The effects of gradually spreading desert are often confused with those of drought. But droughts, no matter how severe, are ephemeral; when the rains return, the land's inherent productivity is restored. With desertification, even normal rainfall cannot fully restore the land. In extreme cases, land may remain unproductive for many generations unless costly remedies are taken.

While drought can help to turn land into desert and make the effects more obvious to people living there, most scientists agree that changes in climate are not responsible for the vast areas of semiarid land going out of production each year. The direct causes of desertification include overcultivation, overgrazing, and deforestation. These practices strip vegetation from the topsoil and deprive it of

nutrients and organic matter, thereby exposing it to erosion from the sun and wind. These direct causes themselves spring from the pressures of rapid population growth. In trying to obtain more food for themselves and their livestock, growing numbers of people frequently overstretch the carrying capacity of semiarid areas: keeping production high during drought reduces the land's natural resilience and sets it on a course to permanent degradation.

Although some 100 countries are affected by desertification, the process is most serious in sub-Saharan Africa (particularly the Sahel), northwestern Asia, and the Middle East. Every year an additional 200,000 square kilometers—an area larger than Senegal—are reduced by desertification to the point of yielding nothing. And the process is accelerating: more than 20 percent of the earth's surface—now populated by 80 million people—is directly threatened. The human costs of desertification often include malnutrition, threat of famine, and dislocation of people who must abandon their lands to seek employment elsewhere.

### **Urban population growth and internal migration**

Beyond a common concern, perceptions of the problem of the distribution of population vary considerably among developing countries. Some see the countryside as overpopulated in relation to its natural resources. Others complain of labor shortages in remote but resource rich areas. Most commonly, however, maldistribution is described in terms of "overurbanization" caused by "excessive" migration. In some developing countries, rapid urban growth has undoubtedly caused serious administrative difficulties. Urban life requires a complicated set of services—housing, traffic, sewerage, water, and so on—that cannot quickly be scaled up as population grows. City administrations are usually short of money, and may anyway lack the managerial skill to cope with a city that doubles its size in a decade. Where this happens, the results are familiar: unemployment, substandard housing, deteriorating public services, congestion, pollution, crime, and so forth.

An overriding concern with the negative aspects of urban growth, however, has often led policymakers to overlook some of the benefits to be gained from internal migration and urbanization. As a result, many governments have chosen to carry out costly—and often economically inefficient—programs to redistribute population. They would have done better to have concentrated on rural



development in areas already settled, on improvements in urban policies and management, on elimination of price distortions (such as keeping food prices low) that encourage urban population growth, and on development of effective family planning programs to reduce rates of natural population increase.

Projections of urban growth (which were shown in Table 4.3) are not meant to predict what will actually happen—merely what would happen if historical trends continued. As such, projections are sensitive to small changes in trends. There is evidence that the rate of urban growth in developing countries slowed slightly after 1973 in response to the world economic slowdown. That decrease could produce a much smaller urban population than shown by the projections. Though this would make urban growth easier to cope with, it would (without a compensating decline in the overall population growth rate) imply faster rural growth.

#### *The benefits and costs of urbanization*

Urban growth gives rise to economies of scale. Industries benefit from concentrations of suppliers and consumers, which allow savings in communications and transport costs. Large cities also provide big, differentiated labor markets and may help to accelerate the pace of technological innovation. They also allow economies of scale for such services as water supply and electric power to be exploited. Evidence from India suggests that substantial economies of scale are found in cities of up to 150,000 inhabitants. The point at which diseconomies creep in, because cities are too big, has not been clearly demonstrated.

Against these benefits, unemployment tends to be higher in urban than rural areas. In a survey of fourteen developing countries, only one (the Islamic Republic of Iran) had a higher rural unemployment than urban unemployment rate; in six countries the urban unemployment rate was more than twice the rural rate. Surveys confirm that air pollution, congestion, social disturbances, crime, and similar problems also increase disproportionately with city size. But these problems are often aggravated by poor urban management. Typically, governments reduce the absorptive capacity of cities by intervening in labor markets (for instance, through minimum wage legislation, and licensing requirements and restrictions on small businesses), and by pursuing inappropriate pricing policies for public services. National economic policies—which provide fiscal incentives and low-

interest loans to promote capital-intensive industry, for example—may also exacerbate urban problems by encouraging rural-urban migration without creating enough new urban jobs.

Whatever the cause, the drift from countryside to city is a concern to governments. A 1983 UN survey of 126 governments of developing countries found that only 3 considered the distribution of their populations “appropriate.” Moreover, all three were governments of small island nations: Barbados, Malta, and Nauru. Concern was greatest in Africa, the Middle East, and low-income Asia: virtually all governments in these regions considered population distribution either “partially appropriate” or “inappropriate.” As a remedy, more than three-quarters of all respondents stated that they were pursuing policies to slow down or reverse internal migration.

Between 1925 and 1950 at least 100 million people in the developing countries—about 10 percent of their rural population in 1925—migrated from the countryside to towns and cities. During the following twenty-five years, the numbers rose to an estimated 330 million, equivalent to almost a quarter of the rural population of the developing countries in 1950. Population movements within rural and urban areas, and temporary migration, have undoubtedly involved even more people, although their numbers are not reliably known.

#### *The role of internal migration*

Current high rates of urban growth in developing countries are only partly due to rural-urban migration. Natural population increase is estimated to account for 60 percent of the rise in urban populations, according to a UN sample of twenty-nine developing countries. Perhaps another 8 to 15 percent is attributable to the reclassification of rural areas to urban status. Additional evidence from India, Kenya, and several West African countries confirms this pattern.

Although fertility rates are on average lower in urban than in rural areas, differences within countries between urban and rural fertility tend to be small (see Chapter 6). Thus the effect of urbanization on aggregate fertility is limited in the short run, especially because migrants tend to be of childbearing age, raising the *number* of births in cities even when the *rate* of fertility is lower. Natural increase in urban areas is therefore substantial.

Migration then puts even greater strain on the capacity of cities to cope with rapidly growing numbers. In broad perspective, the shift of people

from rural to urban areas mainly reflects the process of industrialization and the changes it brings in the demand for labor. Certain conditions in rural areas—unequal land distribution, landlessness, agricultural mechanization, natural calamities, and, in the past, forced labor migrations—have strongly influenced population movements in many countries. But, by and large, people move to towns and cities for higher incomes and better job opportunities.

For individual families, these attractions can be considerable. Once in the city, perhaps three out of four migrants make economic gains. A move from the rural Northeast of Brazil to Rio de Janeiro, for example, can roughly triple the income of an unskilled worker; the family income of a manual laborer in Sao Paulo is almost five times that of a farm laborer in the Northeast. The higher cost of urban living may narrow rural-urban wage differentials in real terms, but urban dwellers also generally have much better access to basic public services. To take one example, in rural areas of sub-Saharan Africa only about 10 percent of the population has access to a safe water supply, compared with 66 percent of the urban population.

Most studies conclude that migrants are assets to the urban economy. They are mostly between the ages of fifteen and twenty-nine and are better educated and more motivated than those who stay behind in the countryside. Evidence from Brazil, Colombia, Kenya, Korea, India, and Malaysia shows that migrants with long urban residence compare favorably with urban-born people in terms of employment and income. A World Bank study of Bogota, Colombia, found that migrants earned more than nonmigrants at all educational levels. Overall, income and employment levels are more a function of age, sex, and education than of whether a person has migrated or not.

Evidence about the impact on rural areas of emigration is mixed. Emigration seldom causes a drop in farm output. In villages of East Kalimantan, Indonesia, for instance, women have adjusted to the departure of male emigrants by working harder at rice and vegetable production. Other reactions include shifts to less labor intensive cropping patterns, increased use of wage labor, and agricultural mechanization.

Urban-rural remittances clearly benefit rural households. Village studies in India, Malawi, and Thailand, however, show that net remittances—migrants receive as well as send money—usually account for only a small proportion of rural incomes. Returning migrants can be an important

source of innovation, but only if opportunities exist to exploit their ideas. Studies in Guatemala, Papua New Guinea, Peru, and Tanzania, for example, have shown that returning migrants can introduce new crops and techniques. Other studies have found that experience gained in modern factories is largely irrelevant to the needs of small villages.

#### *Redistribution policies*

Governments have employed many different approaches to the task of slowing down rural-urban migration, ranging from direct controls on population mobility to efforts to improve economic conditions in the countryside. Few of these policies have achieved their demographic objectives, and their social and financial costs have been high. Moreover, they have often been undermined by national policies in agriculture, industry, and foreign trade.

Direct controls on mobility have been most common in centrally planned economies. China, for example, has employed controls since the early 1950s in an attempt to stabilize its urban population. These controls have taken the form of travel permits and food ration cards that can be used only in specified areas; also, restrictions have been placed on labor recruitment in rural areas by urban industrial enterprises. In some cases large numbers of city dwellers have been exhorted to move to the countryside. The "rustication" program, for instance, resettled some 10 to 15 million urban secondary school graduates in rural areas between 1969 and 1973. Administrative measures have probably helped to slow urban population growth: the proportion of the population in urban areas has changed only slightly over the past thirty years. But the costs were high to individuals, and the economy also suffered from misallocations of labor.

Less stringent controls have been used in Indonesia and in the Philippines. Starting in 1970, migrants to Jakarta had to comply with an array of bureaucratic requirements, including cash deposits and licenses for various business activities, however informal. To limit the growth of Manila, the city government in 1963 decided to charge migrants a sizable fee to enter the public school system; free education was available only to bona fide residents. In both cases, the controls proved hard to enforce, gave rise to petty corruption, and failed to slow urban growth significantly. A variant of such controls has been periodic expul-

sions of unemployed migrants from cities, a practice that has been attempted in parts of Africa, notably the Congo, Niger, Tanzania, and Zaire. They too have had little visible impact.

Population redistribution is commonly a major objective of land-settlement schemes. The transmigration program in Indonesia, for example, aims to ease population pressures in rural Java—with only limited success, it seems (see Box 5.5). Similarly, Brazil's TransAmazon Program did little to further the goal of reducing population growth in the semiarid Northeast. Evidence suggests that the Federal Land Development Authority (FELDA) settlement scheme in Malaysia has succeeded in slowing down intrarural and rural-urban migra-

tion. But costs have been high (about \$15,000 per family in the 1970s), and "second generation" problems—increasing social differentiation in settlement areas, and renewed pressures on land as settler families increase in size—have begun to appear. Although land settlement may have important political and social objectives, a review of World Bank-assisted schemes concluded that, in economic terms, it is usually more efficient to intensify production in already settled areas than to move people elsewhere.

Governments have also tried to modify population distribution by making small and medium-size towns an attractive alternative to the major cities. Evidence from India, Peru, Thailand, and

### Box 5.5 Indonesia's transmigration program

Indonesia's population—estimated at 153 million in 1982—is unevenly distributed over 13,600 islands, covering about 1.9 million square kilometers. A single island, Java, accounts for about two-thirds of the country's population but only 7 percent of the land area. Java has an average of 690 people per square kilometer (higher than Bangladesh); in irrigated areas the density rises to 2,000 people per square kilometer. In contrast, large areas of the other islands, including Sumatra, Kalimantan, Sulawesi, and Irian Jaya, are sparsely populated.

Java has fertile volcanic soils, which allow intensive agriculture without heavy applications of fertilizer. Some 70 percent of the island is cultivated. The other islands, however, have generally poor tropical soils. Over the years, much of the population growth in rural Java has been absorbed through "agricultural involution," a process through which land productivity is raised by adding more and more workers. But growing population pressures have contributed to ecologically harmful farming practices, such as the clearing and cultivation of steep hillsides. More than 23 million hectares have already been degraded. Labor productivity and rural incomes have declined in parts of the island, and landlessness and rural underemployment are widespread. In 1980 an estimated 47 percent of rural Javanese were below the absolute poverty line, com-

pared with 28 percent of the rural population of the other islands.

The big demographic and economic differences among the islands of Indonesia have prompted many programs for moving people from Java to the other islands. The Dutch began a resettlement program in 1905, moving 155 families from central Java to Lampung province in Sumatra. By 1932, some 27,000 people (roughly 1,000 per year) had been moved. Between 1932 and 1969 the program—which became known as "Transmigration" in 1950—slowly gathered momentum. By 1969, about 580,000 more people (about 15,000 per year) had been resettled. But since Java's population grew by some 35 million over this period, the transmigration program had only a minor impact.

With the First Five-year Plan (1969-74), the transmigration program became a national priority and was further expanded. The World Bank has supported this expansion with four loans and one credit, totaling about \$350 million. Since 1969, 479,000 families (approximately 2.4 million people) have been settled outside of Java at an average cost per family varying between \$4,000 and \$8,000. The program has also encouraged some spontaneous migration, estimated at 1 million people since 1969. Although the transmigration program has in recent years succeeded in resettling the equivalent of a quarter of

Java's natural population increase, the island's rate of population growth actually increased slightly from 1.9 percent a year in 1961-71 to 2 percent a year in 1971-80.

Of course, the transmigration program should not be judged solely on its ability to ease population pressures in Java. Emigrants have been drawn from the poorest groups in Java and from the most ecologically vulnerable areas. Reviews of the program carried out by the World Bank found that these settlers were better off in most transmigration sites than they had been in Java. Nevertheless, average crop yields and incomes in upland areas have been low and variable. Of 592 farmers surveyed in communities dependent on rainfed agriculture, only 9 percent reported paddy yields of more than one ton per family.

The Indonesian government has set ambitious targets—to move some 13 million families from Java over a twenty-year period. For the immediate future, the government intends at least to match the target it set in the Third Five-Year Plan (1979-84) of 100,000 families a year. Costs are likely to increase as more and more remote areas are opened up, and this could constrain the program's development. Nevertheless, transmigration will continue to receive a high priority among government programs, not least because of what it can do to alleviate poverty.

other developing countries suggests that this objective is seldom achieved. One exception is Korea: through the introduction of special tax and credit incentives in the early 1970s, industrial activity and people were successfully attracted to smaller cities. One result was that population growth in Seoul slowed from 9.8 percent a year in the 1960s to 4.5 percent a year in the 1970s. But this achievement was helped considerably by a combination of circumstances possibly unique to Korea: a rapidly declining rural population, a stable government, a wide range of social services, and a booming economy.

### **Population growth and the international economy**

Demographic change is tending to increase economic disparities between developed and developing countries. Between now and the year 2000, for example, the number of people aged twenty to forty will increase at about 2.6 percent a year in the developing countries, roughly ten times faster than in developed countries. In absolute terms, the difference is even more striking. Numbers in the twenty to forty age group will increase by 19 million in developed countries, less than one-third of the increase from 1960 to 1980. In developing countries the increase will be 600 million, one and a half times the 1960–80 increase. The size of the working-age population in China and India—which was about 60 percent larger than the total for industrial countries in 1960—will be more than 150 percent larger by 2000. Even if per capita income grows faster in developing than in industrialized countries, the absolute income gap will not decrease significantly because the initial difference in per capita income is, for many developing countries, so large. To what extent can international migration and trade reduce these disparities and alleviate the problem of rapid population growth in developing countries?

#### *International migration*

The motivation for most international migration is the same as for internal migration—higher wages. Historically, some migration may have been directly related to population pressure, but today wage differences are the main driving force. For example, in the late 1970s, an unskilled emigrant worker from Bangladesh earned up to ten times more in the Arab gulf states than he did in his own country. To the extent that population growth affects those differences, it is, of course, indirectly

a cause of migration.

Despite the growing income gap between rich and poor countries and the widening gap in the size of the labor force, the scale of present-day migration is relatively small and unlikely to increase dramatically (see Chapter 4). The most important reason is the immigration policies of host countries. Their policies vary according to their economic needs, but they generally place some limits on immigration because of the effects on the wages of natives and because of social and political tensions that are often created by large-scale immigration.

CONSEQUENCES FOR THE RECEIVING COUNTRY. In general, immigration becomes controversial when new workers reduce wages—usually because the demand for urban labor is not rising fast enough to ensure that an added supply of labor will not cause wages to fall. For example, increased resistance to immigration in the United States after the 1890s was partly the result of a decline in the growth of farmland, retardation of capital accumulation, and technological change that favored capital- and skill-intensive sectors—all of which reduced the growth of demand for unskilled labor. More recently, restrictions on the use of migrant labor in western Europe increased when the 1974–75 recession began.

Host countries generally benefit from immigration; in the Middle East migrants form an indispensable part of the labor force. Host countries can also select immigrants whose skills and qualifications suit their pattern of demand (see Box 5.6). Immigration, often from developing countries, thus provides a flexible source of supply, enabling receiving countries to adapt more quickly to changes in demand than they could do without immigration. But the economic gains to host countries must be balanced against social costs. Immigration can create social tensions, often concentrated locally: whole neighborhoods exist in European countries and in the United States where adults are predominantly first-generation immigrants. Of France's 4 million foreigners, 40 percent live around Paris; in some sections of the city, more than half the primary-school children have foreign parents.

One response of host countries has been to shorten the stay of immigrants through temporary recruitment rather than permanent immigration. These efforts are not always successful: in western Europe, for example, the same workers returned, and the average length of stay increased.

As immigrants increase as a proportion of the population, they receive increasing attention and public resources. In the long run, these factors are likely to be more important than purely economic factors in maintaining limits on immigration.

CONSEQUENCES FOR THE SENDING COUNTRY. A substantial part of recent migration has involved unskilled workers. Migrant workers from the Yemen Arab Republic (constituting more than 30 percent of the national work force in 1981) were practically all unskilled. So were a large proportion of emigrants from other countries that sent labor to the booming Middle East in the 1970s—ranging from about 30 percent for Bangladesh and Jordan to about 50 percent for Egypt. About 50 percent of immigrants into Ghana and the Ivory Coast are employed in agriculture, usually as laborers. Unskilled laborers in western Europe and the United States may be more skilled than those in the Middle East, but they comprised 30 percent of migrant manual workers in Germany and more than 40 percent of temporary workers admitted to the United States in recent years. Illegal workers in the United States are largely uneducated and unskilled.

In some countries emigration has contributed to substantial increases in wages of the unskilled at home. For example, real wages of unskilled construction labor in the largest cities of Pakistan increased at an annual rate of more than 15 percent a year between 1972 and 1978 (faster than the rate of growth of wages of carpenters or masons), after remaining stagnant for several previous years. In the Yemen Arab Republic, which experienced heavy international as well as rural-urban migration, real wages of agricultural labor increased almost sixfold between 1972 and 1978. During 1975–79, they rose from 56 to 63 percent of urban wages; urban wages rose from 45 to 67 percent of those in Saudi Arabia. In Egypt the rate of increase of real wages in construction was about 6 percent a year during 1974–77, after stagnating in the previous ten years. Considering the low wages that the unskilled earn (for example, less than \$2 a day in Pakistan in construction in 1977–78, less than \$5 a day in Egypt in 1977), these wage increases must be considered beneficial, particularly since there is no evidence that output declined.

An additional benefit is the money that emigrants send back home. It serves not only to increase the incomes of their families but also to help finance their country's trade deficit. Workers' remittances increased from about \$3 billion in 1970

to \$27 billion in 1980. In 1980, remittances provided almost as much foreign exchange as exports did for Pakistan and Upper Volta; they were more than 60 percent of exports for Egypt, Turkey, and Portugal, and about 40 percent for Bangladesh and Yugoslavia.

Many countries have special schemes to attract remittances. India and Yugoslavia allow foreign currency accounts, with interest and capital withdrawable in foreign currency. Bangladesh issues import permit vouchers, which carry a special exchange rate and may be freely negotiated. China, Korea, and the Philippines have mandatory remittance requirements.

Migrant workers tend to save a lot. The average propensity to save by Turkish emigrants was 35 percent in 1971 (compared to a gross domestic savings rate of 16 percent), and as high as 70 percent for Pakistanis in 1979 (compared to a gross domestic savings rate of less than 10 percent). The average propensity to remit, which may be more relevant to the emigrant country, was lower, but still 11 percent for workers from Turkey and about 50 percent for workers from Pakistan.

With this new source of income, the living standards of many families improve significantly. A large part of remittances (about 60 percent, according to one survey in Pakistan) is spent on food, clothing, rent, and other standard household items. Many of the consumer durables are imported. Beyond using remittances to increase their current spending, families tend to repay debt and invest their extra income, mostly in urban real estate, and in agricultural land and housing. A survey conducted in 1977 in the Indian state of Kerala showed that land and buildings accounted for an average 75 percent of the value of assets owned by emigrant households. In Pakistan 63 percent of investment from remittances went into real estate, including agricultural land; in Turkey 58 percent of migrants' savings went into housing and land. Investment in equipment and financial assets has been relatively small, although in Mexico and Turkey some remittances have been invested in family-owned commercial and manufacturing businesses. How remittances are used depends on the same factors that determine other private consumption and investment decisions.

In short, emigration by the unskilled generally leads to no loss in production, and if there is a scarcity premium on savings and foreign exchange (generated from remittances), then net benefits from emigration are likely to be large. In fact, it may even be beneficial for countries to facilitate



emigration by providing information to potential emigrants and organizing recruitment on an official basis. Many countries, including Bangladesh, Korea, and the Philippines are in fact doing this.

However, emigration is not totally costless. Temporary migrants and their families often suffer long periods of separation, although there is evidence that women left behind efficiently manage the household and family assets, including agricultural land. Emigration has led to a rapid rate of mechanization in Yemen Arab Republic without a significant increase in productivity, and neglect of infrastructure has led to a collapse of farm terraces. In Oman underground water channels have deteriorated. Emigrant countries may also lose when skilled and professional workers emigrate; these

form a large part of both temporary and permanent migration (see Box 5.6).

#### *International trade: growth and limits*

Trade offers more opportunities for reducing international disparities and absorbing labor in developing countries than does international migration, but the effects of increased trade on labor absorption have, until now, been limited to only a few countries.

Unlike international migration, world trade has grown rapidly in the past three decades, at 6.7 percent a year, compared with less than 4 percent a year in 1800–1913, and only 1.4 percent in 1913–50. Trade has provided developing countries with

### **Box 5.6 The brain drain and taxation**

Between 1969 and 1979, the United States admitted nearly 500,000 professional and technical workers. Three-quarters of them were from developing countries, nearly 50 percent from Asia. During the 1970s they accounted for nearly 30 percent of the rise in the employment of physicians and related practitioners in the United States, for 12 percent of the increase in engineers, and for 8 percent of the increase in scientists.

Countries that import skilled manpower gain on two counts:

- Since professional education is subsidized (about 45 percent of revenues of institutions of higher learning in the United States, for example, come from government), receiving countries save on such public subsidies.

- Since countries can select immigrants, they can adjust more quickly to changes in demand. For example, the share of physicians (and related practitioners) in professional immigration into the United States from developing countries was 12 percent in 1969, rose to nearly 25 percent in 1973, but dropped to 11 percent in 1979 as the number of domestically trained physicians increased.

Certain developing countries have experienced heavy brain drain. Some 36 percent of temporarily recruited migrants from Sudan, for example, were professionally and technically trained.

They included as much as 44 percent of Sudan's engineers, scientists, and medical practitioners. During the 1970s professionals from the Philippines who emigrated to the United States constituted 12.3 percent of the increase in their numbers at home; for Korea the figure was 10 percent. In Bangladesh professional and technical personnel constituted 17 percent of total emigration during 1976–78, and their departure is believed to have contributed to a shortage of several types of professionals. In other countries professional emigration has been large in absolute numbers but not necessarily in relative terms. Professional and technical workers who left Egypt for the United States during 1969–79 were less than 2 percent of the increase in their numbers at home (although professional emigration to the Middle East may be larger). Indian professional emigration to the United States formed about 1 percent of the stock in 1971.

The governments of many sending countries feel that emigration is harmful because they subsidize the emigrants' education but lose the opportunity to tax their incomes. When skilled workers leave, unskilled workers may become unemployed. A country may also put a high social value on the services of professional emigrants, such as doctors and nurses, so that their emigration involves a bigger loss than can be meas-

ured solely by the loss of the money value of their services. Emigration also prevents "internal diffusion"—skilled people moving to backward areas within a country.

These costs are hard to quantify and depend on each economy's institutional features. Some of them can be reduced or avoided by a change in the policies of the sending countries. There is, for example, little justification in subsidizing higher education when the beneficiaries are the richer elite, or when the probability of their emigrating is high. Governments may also feel that they have a right to tax the incomes of skilled emigrants, especially if emigrants remain citizens of their home country. The United States and Philippines, for example, tax their citizens when they live abroad.

There are few estimates of how much revenue would be raised by taxing emigrants. If it is assumed, however, that 90 percent of all professional immigrants admitted to the United States during 1969–79 were still there in 1979, and that within each major occupation they matched the average earnings of American workers, their total earnings in 1979 would have been about \$6 billion. A 10 percent tax would thus have yielded \$600 million—some 13 percent of Official Development Assistance from the United States in that year.

extra jobs, directly in the export sector and indirectly as demand for inputs and services has increased. In Korea an estimated half a million jobs in 1970 (about 60 percent of them in manufacturing) were attributed directly and indirectly to exports. For all developing countries, however, manufacturing exports have added few jobs in relation to the increases in the size of the labor force. Most of the increase in manufactured exports (and thus in total exports, since nonfuel primary exports have grown less rapidly) has been in the (now) middle-income countries. Between 1965 and 1980 manufactured exports of all developing countries increased by \$128 billion, but middle-income oil-importing countries, with a population of 600 million (out of 3 billion in all developing countries), accounted for 80 percent of that increase. Five countries—Brazil, Hong Kong, Korea, Singapore, and Yugoslavia, with 200 million people—accounted for 55 percent of the increase. Manufactured exports of low-income countries, with a population of 2.2 billion in 1980, increased by only \$14 billion, and those of low-income Africa by \$0.5 billion (see Table 5.8). Total exports of low-income countries also grew slowly, reflecting (with a few exceptions such as India) their dependence on primary exports, which grew at only 6.8 percent a year in volume. To the extent that export revenues determine imports, primary exporters have gained little, particularly in the face of large increases in population.

EXPORTS AND EMPLOYMENT. Export success does not rely solely, or even necessarily, on a large labor force and low wages. Of greater importance are an outward-looking trade policy and a relatively skilled labor force. As discussed in Chapters 2 and 3, exports of many countries have been inhibited

by inward-looking trade policies and price distortions. Ironically, employment has suffered as a result: there is now ample evidence that industries geared to import substitution create fewer jobs than do export industries. Evidence from Brazil, Indonesia, and Thailand, for example, shows that labor employed per unit of value added was twice as high in export industries as in import-substitution industries. In Korea in 1968 manufactured exports were 33 percent more labor intensive than domestic manufactures, and 50 percent more labor intensive than import-competing industries. The unskilled labor component in export industries is also generally high—50 to 100 percent higher than in import-competing ones.

The accumulation of human (and physical) capital necessary to expand export capability is, as shown above, made more difficult if population is growing rapidly. Even simple manufactures such as textiles and clothing (the commodities that developing countries typically export to start with) require skilled workers and versatile managers and entrepreneurs who can keep up with changing fashions and preferences. Modern textile plants tend to use expensive equipment: fixed capital per employee in Indian firms using nonautomatic power looms in 1963 was \$1,600, more than seven times the per capita income in that year.

Table 5.8 gives some indication of the differences in human capital between low-income Africa, the least successful exporter of manufactures, and middle-income oil importers, the most successful. In both groups the labor force has grown at about 2 percent a year. But in 1960 the (now) middle-income countries had, on average, a higher adult literacy rate, a higher index of human skills (defined as the secondary-school enrollment rate plus five times the enrollment rate in higher educa-

TABLE 5.8  
Export structure and human capital

Country group	Percentage of manufactures in				Value of manufactured exports (billions of dollars)		Adult literacy rate		Index of human skills <sup>a</sup>		Rate of growth of labor force (1960–81)
	Exports	1980	GDP	1981	1965	1980	1960	1980	1960	1979	
Low-income Africa	9.8	9.3	6.2 <sup>b</sup>	8.7 <sup>b</sup>	0.2	0.7	15	39	2.4 <sup>c</sup>	19.0	2.0
Low-income Asia	37.4	41.8	13.0 <sup>d</sup>	17.0 <sup>d</sup>	1.9	15.4	36	53	30.0 <sup>d</sup>	58.4 <sup>d</sup>	1.8
Middle-income non-oil	23.0	51.6	22.0	25.0	4.3	108.9	58	72	38.0	109.0	2.2
Industrialized countries	69.6	73.5	30.0	25.0	86.9	902.3	96	99	144.0	274.0	1.3

a. Defined as the secondary school-enrollment rate plus five times the enrollment rate in higher education.

b. Based on a limited sample.

c. Secondary-school enrollment rate.

d. Excludes China.

## Box 5.7 Coping with rapid fertility decline: supporting the elderly in China

Slower population growth can help developing countries raise living standards more quickly. But a rapid transition to slow growth does require adjustment—most importantly in providing security to the elderly. China's official demographic target calls for a population of 1.2 billion by the year 2000, requiring that the total fertility rate stay below 2 for the rest of this century and that many couples have only one child.

What are the economic implications of lowering fertility well below replacement level? During the remainder of this century there would be some economic advantages but they are not dramatic. If the total fertility rate is reduced to an average of 1.7 between 1985 and 2000 (which would keep population to 1.2 billion in 2000, according to World Bank projections), the school-age population would decline to about two-thirds of its 1980 level by the year 2000. The declines would be greater in those regions where many couples have already pledged to have no more than one child (see Box 8.9). Savings could be allocated to somewhat more rapid expansion of secondary education.

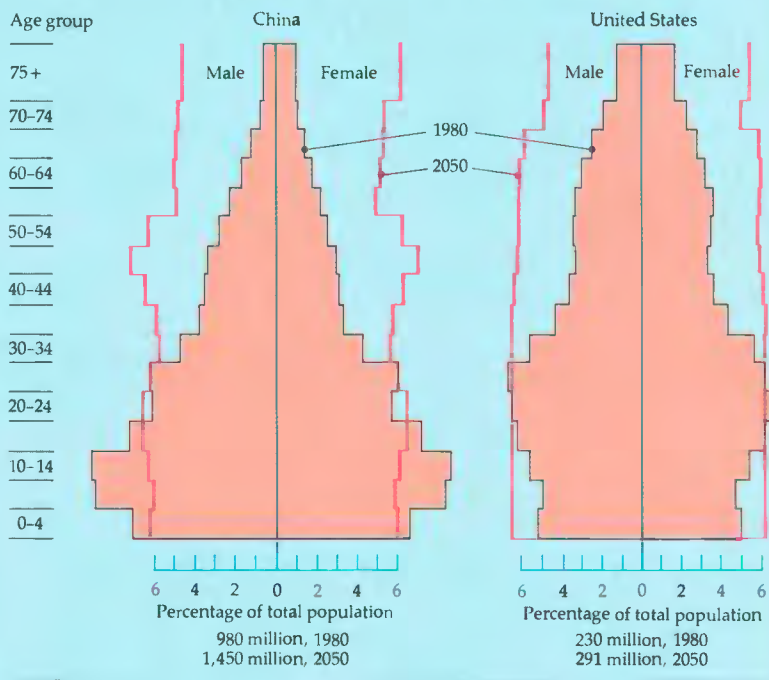
But, in the long run, the decline in the proportion of young people would be offset by a large increase in the proportion of the elderly. Assuming fertility rises again to replacement level after 2000, the proportion of persons in the working-age group would not fall and the overall dependency ratio would not increase in the next century. But the structure of dependency would be markedly different—with the labor force supporting the dependent old rather than the dependent young. In 1980, 60 percent of the population was of working age (fifteen to sixty-four years) and only 5 percent (about 45 million people) was aged sixty-five and over. In the year 2050—when today's fifteen-year olds are aged eighty—the proportion of the working-age group would still be 61 percent,

but the proportion older than sixty-five would be 21 percent, by then about 308 million people. This level of elderly dependency is unprecedented even in the developed countries, where the proportion aged sixty-five and over ranges from about 8 percent in Japan to 18 percent in Sweden in 1980, and is about 11 percent in the United States (see chart).

The much larger proportion of the elderly would be somewhat offset by a decline in the numbers of young people, from 36 percent in 1980 to 18 percent in 2050. Young adults would then have fewer children to support, but, for those from one-child families, no siblings to help support their parents. Consumption requirements of the elderly are about double those of children, and at present few Chinese workers (only about 15 percent of the labor force) are covered by pension schemes; very few of those covered are in rural areas.

The most severe burden will be created by the large cohorts of the late 1960s and early 1970s who are now beginning to enter the labor force. Pension funds to cover the retirement of these workers, with opportunities to earn interest and reinvest the substantial net income that such funds would receive in their early years, are urgent if present population policies continue; indeed, they may well be necessary to sustain the desired fertility decline. But they will be difficult to finance at China's still relatively low income level. In developed countries, with income per worker ten to thirty times greater than in China, each worker in 1980 supported only half as many pensioners as a worker in China would have to in the future if present demographic goals are to be met. Yet even now in developed countries, there are problems with public financing of old-age security systems.

Population pyramids, China and United States, 1980 and 2050



tion), and a larger share of manufactures in output than low-income Africa. Low-income Asia occupies an intermediate position on most indicators; in 1960 it had a nearly comparable level of human skills and a higher share of manufactures in exports than middle-income countries. The comparatively slow increase in exports of manufactures from low-income Asia is as much attributable to inward-oriented policies in the two largest countries (China and India), at least until recently, as to any lack of export capabilities.

These simple correlations should not be carried too far. Even among the successful exporters, some countries have fared better and others worse than their skill index in 1960 might suggest. Nevertheless, these comparisons show that factors such as a literate and educated labor force, accumulation of physical capital, and economic diversity are important for growth of manufactured exports.

### Conclusions

Population and development are intertwined in many ways, not all of them fully understood. Moreover, the effects of population growth may vary widely, depending on the institutional, economic, cultural, and demographic setting. Slow population growth itself requires new adjustments to support the growing burden of dependent elderly (see Box 5.7). The complexity of the subject makes it tempting to be agnostic about the consequences of rapid population growth. Nevertheless, the evidence discussed above points overwhelmingly to the conclusion that population growth at the rapid rates common in most of the developing world slows development. At the family level, as Chapter 4 showed, high fertility can reduce the amount of time and money devoted to each child's development. It makes it harder to tackle poverty, because poor people tend to have

large families, and because they benefit less from government spending on the programs they use most—health and education, for example—when public services cannot keep pace with population growth. At the societal level, as this chapter has emphasized, it weakens macroeconomic performance by making it more difficult to finance the investments in education and infrastructure that ensure sustained economic growth.

Population growth eventually slows as parents decide to have fewer children. The factors behind parents' decisions, discussed in the next chapter, then work their way through to benefit society as a whole. But it does not follow that slower population growth will be an immediate panacea for developing countries. Declines in fertility, for example, will cut the growth of the labor force only after fifteen to twenty years.

In the meantime, there are various nondemographic measures by which countries can ease those development problems made more difficult by population growth. The adoption of trade and exchange rate policies that do not penalize labor and the dismantling of institutional barriers to creating jobs would ease the employment problem. Pricing policies in agriculture and more resources allocated to rural credit, agricultural research and extension, and so forth, would increase agricultural output.

In short, policies to reduce population growth can make an important contribution to development (especially in the long run), but their beneficial effects will be greatly diminished if they are not supported by the right macroeconomic and sectoral policies. At the same time, failure to address the population problem will itself reduce the set of macroeconomic and sectoral policies that are possible, and permanently foreclose some long-run development options.