

## FORUM: POPULATION PLANNING

### People Versus Development: An Overview of the Economics of Population Growth

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Population growth and economic change are tightly bound together. The very high rates of population growth in the poor countries of Africa, Asia, and Latin America complicate the resolution of basic economic problems and make it more difficult to assure an adequate rate of growth of income per capita. Simultaneously, the relative stagnation of per capita incomes, especially in the rural areas of the very poor countries, helps to maintain high levels of fertility, thus completing a circle of rapid population growth and poverty. There is no one solution to the dilemma. Neither dramatic improvements in the standard of living nor the rapid adoption of fertility control are likely in the poorest countries. Moreover, population control by itself will certainly not solve the problem of poverty, both because population limitation without economic growth would merely share the poverty and because the masses of the population are unlikely to reduce their fertility without the prospect of some improvement in the standard of living. On the other hand, it seems to be equally clear that, with the exception of those few countries that are possessed of enormous wealth in the form of natural resources, poverty will not be eliminated without a major reduction in the rate of population growth. Thus, the best hope lies in some judicious combination of social and economic reform and population control. This solution probably implies an increased commitment of finance and other resources to population programs.

The individual human beings who populate the earth are also the building blocks of the economic and social structure. Changes in the number and the age structure of a population inevitably affect the manner in which people win their livelihood from nature; conversely, the nature and health of the economic system have a powerful influence on the basic demographic processes of fertility and mortality. Thus, the numbers and age structure of the population and the economy are synergistically determined components of the same system. It is ironic, then, that to this date our knowledge of the relationship between economic and demographic variables is highly inadequate and much debated. The pervasive influence of population growth is a principal reason for our continuing ignorance. Almost every aspect of our lives is touched by the demographic context in which we live. Furthermore, population growth is not an insignificant quantitative phenomenon. Over 70 million more births than deaths are likely to occur during 1976. At this rate, it will only take 3 years for world population growth to generate an additional population equivalent to the contemporary population of the United States. Moreover, most of these additional people will live in the poor developing countries of the world.

Population growth and economic growth are interdependent, but they do not interact in isolation. Both spheres of human behavior are affected by and, in turn,

affect other areas. The political, social, psychological, and technological environments all interact with the economic and demographic aspects of human life. In much of the following discussion, we will talk of the economic demographic relationship in isolation. To that extent, the discussion will be misleading and may overstate the strength of some of the relationships discussed. At this stage in our knowledge, however, the opposite approach—attempting to take all factors into account—would be even more inappropriate, since we just do not have sufficient information to relate all aspects of human life.

The central purpose of the present essay is to catalogue the state of our knowledge about the contemporary interdependency between population growth and economic activity in the developing countries. A secondary theme is the derivation of some relevant policy propositions. The treatment is, of necessity, brief. A much more extensive treatment can be found in the materials cited in the references.

Part I of this paper deals with population growth and its components. Various population growth patterns are described and a taxonomy of growth patterns is presented. Part II deals with the economic consequences of population growth. I initially focus on the situation in developing countries, but the last subsection discusses the economic consequences of demographic patterns in the industrial countries of the world. Part III of the paper describes the economic determinants of population growth. It has been popular since the World Population Conference (Bucharest, 1974) to suggest that development is itself the best solution to the "population problem." That proposition and the wider set of findings which related fertility and population growth back to the prevailing structure of the economy are explored in detail. Part IV deals with the policy implications of the earlier discussion.

## I. POPULATION GROWTH

The total number of people in a population changes as people enter the population through birth or in-migration or leave it through death or out-migration. Under most conditions in the contemporary world, migration between nations is a relatively minor phenomenon. Under those circumstances when migration can be ignored, the growth rate or the rate of natural increase of the population is defined as the difference between the birth rate and the death rate.<sup>1</sup>

The growth rates observed in the world vary a great deal. There are many countries in Europe in which the population is growing slowly, less than 0.5% per year. Other populations, largely in the developing countries, are growing at rates above 3% per year. To the uninitiated, these differences in growth rates may seem small. The implications over time, however, are mind boggling. A population

<sup>1</sup> The crude birth rate is the number of births occurring during a year divided by the midyear population and, by convention multiplied by 1,000 to avoid a small decimal. The death rate is defined analogously. There are, of course, many measures of fertility and mortality that are more exact and appropriate for some purposes than crude birth and death rates, but, for this paper, the less exact measures will serve. For a discussion of the alternatives, see Barclay (5).

growing at 0.5% per year will double in about 140 years; a population growing at 3% per year will double in 24 years. In other words, during the time it takes one population to double, the other will grow by a factor of about 60. These differences in growth rates are largely the result of fertility and mortality patterns. Some examples of different rates of growth and the associated birth and death rates are shown in Table 1.

Caution should be exercised in comparing population growth rates. During 1973, the birth rate of the United States was 14.9/1,000 and the death rate was 9.4/1,000, resulting in a rate of natural increase of 5.5/1,000 or slightly more than 0.5% per year. During the decade of 1901–1911, the population of India grew at very nearly the same rate. Thus, the recent rate of growth of the American population and that of India during the early part of this century are of similar orders of magnitude. Yet a more detailed examination of the demographic conditions in the two societies reveals them to differ in almost all other respects. Both fertility and mortality were much higher in the Indian population. The reason that the growth rates are similar is that the high fertility in the Indian population was offset by high mortality. Indian men and women and children were dying at a faster rate in all age groups than their American counterparts. It was only very high fertility which permitted the population to grow. Moreover, the Indian population had (and still has) a much younger age distribution than does the contemporary United States. While the former had over 40% of its population under 15, the latter has only 30% in those ages. Conversely, the Indian population has a much smaller proportion of people in the ages above 60.<sup>2</sup> These demographic differences between the two countries necessarily have strong implications for the human condition. A population in which the typical child survives for only 30 years is very different from one in which the average child lives to the age of 70. Similarly, life patterns in a society in which the average woman who survives through the child-bearing years will have borne seven or eight children are in stark contrast to those of the United States, in which three children might be more typical. In short, demographic patterns are only imperfectly described by the growth rate of a population, and, in much of the following discussion, I will make reference to the component birth and death rates or to other demographic measures that can be used to round out the picture of population growth.

There has been a considerable but geographically uneven acceleration in the growth rates of population during the past decades. Most of the increase in population growth rates is attributable to the decline in the level of mortality in the developing countries. With the advent of new forms of disease control, higher incomes, and better communication, the death rate has fallen in most of Asia, Africa, and Latin America. Fertility has tended to remain high and, as a result, the rate of growth of a population has increased to the almost unprecedented level of 2.5 to 3.0% per year. In contrast, in a few of the developing countries, there has also been a fall in fertility with the consequence that population is growing at the rate of 1% or less per year.

<sup>2</sup> In contrast to what one might intuitively believe, this difference in age structure is more the result of the fertility differential between the two cases than it is of the mortality differential (see 10).

TABLE 1  
DEMOGRAPHIC AND ECONOMIC CHARACTERISTICS OF SELECTED COUNTRIES<sup>a</sup>

Country	Period of observation	Crude birth rate (%)	Crude death rate (%)	Natural increase (%)	Infant mortality rate (%)	Per capita income (in U.S. dollars)
Mexico	1955-1959	44.9	12.2	32.7	77.7	—
	1972	44.7	9.1	35.6	60.9	655
Algeria	1965-1969	49.1	16.9	32.2	142.0	295 (in 1970)
United Republic of Tanzania	1965-1969	47.2	22.1	25.1	163.0 (in 1964)	120 (in 1973)
India	1901-1911 <sup>b</sup>	48.0	42.6	5.4	—	—
	1965-1969	42.8	16.7	26.1	139.0 (in 1959)	93 (in 1970)
Mainland China	1955-1959	42.8	8.0	34.8	34.2	—
	1973	23.8	4.8	19.0	16.2	—
Japan	1939-1941 <sup>c</sup>	29.0	16.5	12.5	92.0	—
	1973	19.4	6.6	12.8	11.3	3,292
Sweden	1798-1802 <sup>c</sup>	31.2	25.8	5.3	—	—
	1873-1877 <sup>c</sup>	31.0	19.2	11.7	—	—
	1933-1937 <sup>c</sup>	14.0	11.6	2.3	—	—
	1955-1959	14.5	9.6	4.9	17.0	—
	1973	13.5	10.5	3.0	9.6	5,596
East Germany	1973	10.6	13.7	-3.1	16.0	—
USSR	1955-1959	25.3	7.7	17.6	47.0	—
	1973	17.6	8.7	8.9	26.3	—
United Kingdom	1973	13.9	12.0	1.9	17.2	2,503 (in 1972)
United States	1800-1810 <sup>d</sup>	55.0	19.8	35.2	—	—
		47.5	12.3			
	1935 <sup>e</sup>	16.9	10.9	6.0	—	—
	1955-1959	24.9	9.4	15.5	26.4	—
	1960-1964	22.4	9.5	12.9	25.3	—
	1965-1969	18.2	9.5	8.7	22.7	—
	1973	14.9	9.4	5.5	—	5,554

<sup>a</sup> Source: Unless otherwise stated, see "Population Index," Vol. 40, No. 3, July 1974; per capita income, see "Statistical Yearbook 1974," pp. 644-648, United Nations, New York.

<sup>b</sup> Davis, K. "Population of India and Pakistan." Russell & Russell, New York, 1968.

<sup>c</sup> Keyfitz, N., and Flieger, W. "World Population," pp. 468, 485, and 500. University of Chicago Press, Chicago, 1968.

<sup>d</sup> Potter, J. The growth of population in America, 1700-1800, in "Population in History" (D.E. Glass and D.E.C. Eversley, Eds., pp. 667 and 672. Edward Arnold, London, 1965.

<sup>e</sup> "Vital Statistics Rates in the United States 1900-1940," pp. 124 and 667. U.S. Bureau of Census, Washington, D.C.

TABLE 2  
POPULATION AND POPULATION GROWTH BY REGION, 1976<sup>a</sup>

(1) Population mid-1976 (millions)	(2) Percentage of world's population	(3) Crude birth rate	(4) Crude death rate	(5) Rate of natural increase (%)	(6) Projected number of people added in 1976 (millions)	(7) Percentage of world population growth in 1976	(8) Per capita national product in 1974 (U.S. dollars)
World	100	30	12	1.8	71.9	100	1,360
Africa	10.4	46	20	2.6	10.7	14.9	340
Asia	56.9	33	13	2.0	45.7	63.6	450
North America	5.9	15	9	0.6	1.4	1.9	6,580
Latin America	8.1	37	9	2.8	9.1	12.7	940
Europe	11.8	15	10	0.5	2.4	3.3	3,680
USSR	25.7	18	9	0.9	2.3	3.2	2,300
Oceania	22	22	10	1.2	0.3	0.4	3,800

<sup>a</sup> Source: 1976 World Population Data Sheet, Population Reference Bureau, 1976.

Table 2 shows the distribution of world population and population growth as estimated by the Population Reference Bureau for 1976. By historical standards, current world population growth rates are high, but these rates are a combination of unprecedentedly high rates among the poor countries of the world and unusually low rates of growth among the rich countries of the world. Of the approximately 72 million people who will be added to the Earth's population in 1976, over 65 million, or the overwhelming majority, will live in the countries of Asia, Africa, and Latin America; these countries are, with few exceptions, poor. The distribution of new people among the continents is illustrated in Fig. 1. Thus, the economic consequences of rapid population growth are most seriously felt in the poor countries. This central fact provides the basis for the emphasis in this paper on the relationship between economic and demographic phenomena in the poor developing countries.

The consequences of population growth depend very much on the form that growth takes. Today, there exists a whole spectrum of countries experiencing different patterns of population growth. To facilitate the discussion, the demographic characteristics associated with several different types or patterns of population growth are presented in Table 3. Not all countries fit the suggested patterns. For example, preindustrial Europe did not experience fertility nearly as high as that of the contemporary developing countries. Also, the age structures of a population with a history of strong fluctuations in fertility, such as the contempor-

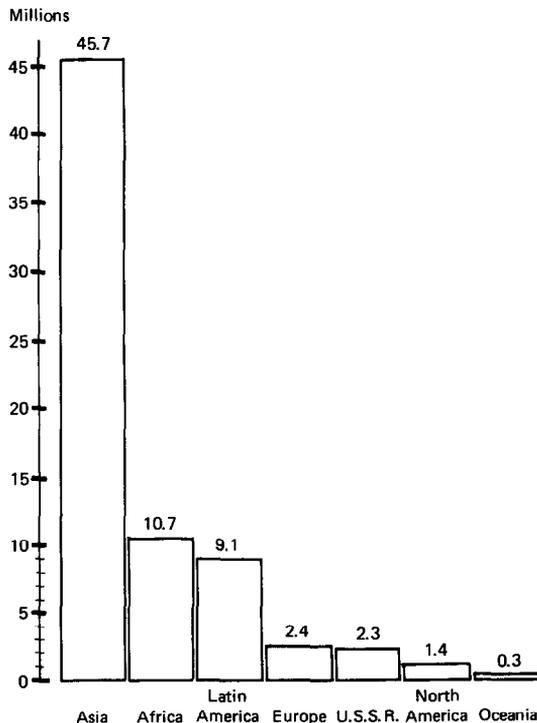


FIG. 1. Project additions to total population in 1976 by major geographical regions.

ary United States, will differ from those associated with these ideal models. The four populations are, however, sufficient to describe in a general way most of the populations that exist in the world today. More particularly, these populations can be thought to represent four different stages in the evolution of a population from the stable condition of high fertility and high mortality.<sup>3</sup> Note, however, that there is no guarantee that any such evolution will take place in the countries of rapid growth. Mortality rates could also return to previous high levels, or there could be a continuing vacillation in demographic trends.

*Type I: Traditional Underdeveloped Country*

Populations of this type have high mortality and high fertility. Life is short and brutal. High fertility implies that the population has a large proportion of children; in fact, nearly 40% of the population is less than 15 years old. On the other hand, the

TABLE 3  
THE CHARACTERISTICS OF FOUR TYPES OF POPULATION<sup>a</sup>

	Population			
	Type I Traditional poor	Type II Modern LDCs	Type III Contemporary developed countries	Type IV Future developed countries
(1) Crude birth rate	47.28	42.5	19.76	13.8
(2) Crude death rate	37.28	12.5	9.76	13.8
(3) Rate of growth (percentage per year); $3 = 1 - 2$	1.0	3.0	1.0	0
(4) Percentage of population aged 0-14	38.9	44.3	26.8	20.12
(5) Percentage of population aged 15-59	56.0	51.0	57.9	58.1
(6) Percentage of population aged 60+	5.1	4.7	15.3	21.8
(7) Dependency ratio [(4 + 6)/5]	0.787	0.964	0.727	0.722
(8) Average age of population	24.45	22.41	33.35	38.61
(9) Doubling time	70	24	70	—
(10) Life expectancy at birth	27.5	55.0	72.5	72.5

<sup>a</sup> Source: The female West tables in "Regional Model Life Tables and Stable Populations" (A. J. Coale and P. Demeny, Eds.). Princeton University Press, New Jersey, 1966.

<sup>3</sup> In each case, I assume that the demographic conditions described have prevailed for some time so that the population corresponds to what the mathematical demographer calls a stable population. Under these conditions, there is no distortion of the population age structure resulting from changes in fertility and mortality. The demographic character of the population is assumed not to have been influenced by the fluctuations in mortality and fertility that are caused by the introduction of public health measures, war, economic depression, or any other perturbation in the social setting. Migration is also assumed not to exist. These assumptions may seem to be extreme, but the resulting populations correspond reasonably well with populations existing in the real world.

high mortality means that few reach old age. Many of the countries of Asia or Africa had this kind of demographic pattern before World War II, e.g., the population of India, 1901–1911, as given in Table 1. Few, if any, national populations have such high mortality in the contemporary world, although there may well be regional populations that fit the pattern.

*Type II: Modern Underdeveloped Country*

In such populations, fertility remains high, but mortality has fallen to levels much lower than in the Type I population. People live longer, but fertility is still high and, as a result, the population is growing at the very high rate of 3%/year. Also, as a result of the continuing high fertility, the population is very young. Most of the contemporary developing countries of the world have populations of this type (e.g., Mexico, India, or Egypt).

*Type III: Contemporary Developed Countries*

Both fertility and mortality have fallen in this kind of population. As a result, the population has a smaller proportion of children and a larger proportion of people 60 years old and older. The growth rate of the population is lower than in Type II, but it is still high enough to double the population in 70 years. The United States and most of the countries of Europe had populations of this type during most of the 1950s and 1960s.

*Type IV: A Possible Future*

Fertility and mortality have both reached very low levels. Eventually, the population will cease to grow and the number of deaths each year will equal the number of births. As a result, the proportion of children is the lowest and that of older people is the highest of any of the populations discussed. The population of Sweden has approximated this type for some time, but a growing number of developed countries have birth and death rates characteristic of a replacement level of reproduction. They continue to grow because of the large number of young people in the reproductive ages, but, if present trends continue, this growth will cease.

Actual populations may differ in considerable detail from the above. Any particular country may, at different times, be characterized by the fertility and mortality of several of the types described here, and the resultant age structure will be a legacy of the past history of vital rates. Most of the developing countries of the world have changed their fertility and mortality patterns from those described under Type I to those of Type II, and a few seem to be moving toward the patterns described by Type III. They may eventually move to the Type IV pattern.

There was a time when it was customary to discuss the movement from high mortality and fertility to low mortality and fertility under the heading of "demographic transition" and to attribute major importance as a paradigm to the sequence of vital rates and growth characteristics (57). In particular, importance was attached both to the fact that mortality decline was the first change and to the associated idea that the fertility and the mortality decline were in some way associated with increasing prosperity. Now it is recognized that this sequence has none of the properties of a natural law. There are many other possible patterns of demo-

graphic development. Nonetheless, there is good reason to think that population growth rates will eventually have to decline. The most desirable basis for the decline will be a reduction in the fertility to offset the mortality decline that has already taken place in most countries of the world. Certainly, fertility change will be the major goal of any population policy designed to regulate the total numbers of a population. Thus, it is important that, in the following discussion of the economic consequences of population growth, we concentrate on the economic consequences of changes in fertility rates.

There are many possible responses to rapid population growth. Some of these reactions take the form of changes in the economic activities that people undertake; but people can also respond to population growth by altering their demographic behavior or changing their psychological perspective on the world (15,18). There are two levels on which one can discuss the reactions to population growth. First, one can examine the reactions to population growth at the level of the individual, the family, or the village. Second, one can look at the reaction to population growth at the level of the society as a whole. Let us examine the range of possible responses for a family as its numbers grow. The working members of the family may work longer hours to provide for the extra members; they may alternatively work the same length of time, but cut back on their saving and try to make ends meet by consuming a higher proportion of the income that they have. Either the family as a whole or some of the adults could move to a new location, such as a city, where there might be greater opportunities for making a living. They could adopt new forms of production designed to get more output from the resources at their disposal. They could just spread the income that they have evenly among the various members of the family that have a claim on a share of the income. They might use some combination of the various possible reactions. People may also respond by changing their fertility behavior; for example, they may marry later or have fewer children within marriage.

Reactions may go beyond the realm of the family. As populations grow, there will be increasing pressure on the labor market. Wage rates may not increase as rapidly as they would under conditions of less population growth. The common experience of this and other society-level problems may lead societies to collectively react to population growth in ways that leave little room for individual choice. One reaction is not possible—to do nothing. The very existence of the larger population forces some sort of adaptation. At the level of the society, the reactions will reflect the cumulative and simultaneous behavioral changes taking place in thousands of families. Many of the reactions will be located in the economic sector. These are the subject of the next section.

## II. POPULATION GROWTH AND THE ECONOMY

### A. *The Contribution of Malthus*

The relationship between population growth and the development of a national economy has been a subject of interest and controversy since the end of the 18th century when Thomas Malthus wrote his polemical "Essay on Population."<sup>4</sup>

<sup>4</sup> Applebaum (2) has produced a recent edition of Malthus' work which very helpfully contains portions of several editions of the essay and selections from followers and critics.

Malthus postulated that population growth would be a function of economic growth; specifically, a population would continue growing unless mortality increased sufficiently to bring it in check. On the other hand, population growth, or rather the growth of the labor force, contributes to the growth of economic output, but the extra output associated with increases in the labor force is diminishing. Diminishing returns, in the Malthusian model, are a natural consequence of the fact that the supply of arable land and natural resources is fixed. Consequently, a time would come when population growth would have outpaced economic growth and brought the positive check of mortality back into play. Population growth would outstrip the growth in the food supply. Thus, in Malthus' model, population growth is the underlying cause of this world's misery. Such being the case, Malthus and at least some of his latter-day followers have argued that it is idle for reformers or developers to attempt to change social institutions or to spend funds on development, for population growth would inevitably eat up the gains. The tone of Malthus' work indicates that he believed that the checks of which he spoke would come into force in the not too distant future. To the extent that the Malthusian theory is essentially concerned with the short run, it has been refuted by much of the experience of the past two centuries. Population growth rates have gone up, but so has the average level of living for most of the people of the Earth.

In contrast to Malthus, modern discussion of the relationship between population growth and economic development has concentrated on a more complicated set of interrelationships. Much stress is laid on the possible contributions of capital formation and technological progress to the process of economic growth. Moreover, in the realm of policy, it is recognized by many today that institutional change does offer a hope for continued improvement of the human condition. For example, land reform and education campaigns may lead to fundamental improvements in the lives of the people they reach. But, even within the new framework, there is some evidence that rapid population growth has adverse consequences for economic measures of human welfare. Thus, the debate continues: Is the well-being of the country adversely or favorably affected by population growth?

Malthus was primarily concerned with the total size of the population and its effect on the well-being of the nation, whereas modern discussions have been equally concerned with the effects of age structure on the economy. The rate of growth of the population is certainly important, but its effect may be largely felt through the age structure. For example, a high proportion of children less than age 15 in a population indicates both that the average adult in the population will be providing for a large number of dependents and that the labor force will be growing rapidly at least until that set of children reaches maturity. Furthermore, a rapidly growing population tends to be very young. The Type II population is a good example: 44% of its population is less than 15 years of age. By way of contrast, children make up only 27% of the population of Type III and 20% of the population of Type IV. In the remaining part of this section, we review the effects of both population size and age structure on the economy.

#### *B. The Economic Consequences of Population Growth for LDCs (Less Developed Countries)*

In most discussions of the sources of economic growth in the developing coun-

tries, stress is laid on the factors which determine the productive capacity of the country. The term "factors of production" (e.g., labor, land, machinery) is used to describe the inputs that are used in the process of production. Within this framework, the central problem of development is thought to be increasing the factors of production most necessary for economic growth. It is the supply of factors that determines the capacity of the economy to produce the goods and services consumed by the public. Economists usually group the factors of production into categories—land, capital, labor, technology, etc. According to the capacity approach to development, economic growth results from an increase in the quantity or quality of the labor force, from an improvement in or an enlargement of the capital stock which exists in the country, or from some change in the manner in which capital and labor are combined in the process of production, i.e., in the technology of production. Population growth affects economic growth through its impact on the labor force, on the capital stock, and/or on the state of technology.

In the following analysis, I describe what is known about the effects of population growth on national income—the *total* output of goods and services. Note that this measure is *not* the same as *per capita* income. Per capita income is total output divided by population; this implies that total output may be increasing while per capita income is decreasing. To anticipate, I will argue that the impact of population growth on total GNP will differ from country to country. In the very poor countries, the effect may be slightly negative, whereas, in the better situated countries, it may be slightly positive. On the other hand, in terms of per capita income, the high rates of population growth have strong negative implications for almost all developing nations. Thus, this distinction is important to keep in mind (52,54).

In examining the effects of population growth on the economy, it is important that we remain clear on the underlying methodology. A statement that a particular rate and form of population growth have an effect on the economy at least implicitly suggests a comparison with some other growth pattern. The conclusion drawn depends heavily on the choice of comparison. For example, Type I and Type III populations both grow at the rate of 1.0% per year; yet they differ enormously in almost all other demographic characteristics, and the implications of these differences for economic growth are very important. In much of the remainder of this section, when I talk about the effects of population growth, I am comparing the effects of the Type II pattern of growth with the effects of that of Type III.

1. *The quantity and quality of labor.* Population growth affects both the quantity and quality of the labor force. The *quantity* of labor that is available for productive use in an economy depends upon three factors. First, how many people in the population are in the working ages? Children and the aged cannot work and thus should not be included in the estimation of the labor available for production. Second, of the population in the working ages, how many are participating in the labor force, i.e., how many either are working or are willing to work if they could find jobs? Finally, how many of the people in the working ages who are actually participating in the labor force are able to find work?

Population growth affects nearly all of the determinants of the supply of labor. The clearest example is the number of people who are in the working ages of the population. Two counteracting factors should be noted in this regard. First, in a rapidly growing Type II population, the people in the labor force ages constitute a smaller proportion of the population than in a moderately growing Type III population with the same total numbers. However, the rapid growth of the Type II population soon causes its population of labor force age to exceed that of the Type III population. Thus, the more rapidly growing population will eventually have the larger labor force. However, in the absence of a decline in fertility, that larger labor force will be compelled to assume the economic burden of an even larger number of young people in the dependent ages.

Population growth also affects the rate and level of participation in the labor force. For example, high fertility in the rapidly growing population may be one factor encouraging low female labor force participation rates, especially among women who work for wages.<sup>5</sup> Women are, for better or for worse, the customary custodians of children, and high and prolonged fertility means that they will have fewer opportunities to join the wage-labor force. Furthermore, these women will have had fewer opportunities for education or other experience that would increase their productivity as workers, but which would conflict with childrearing duties.

There has been a protracted debate among economists as to the actual productivity of labor in the agricultural sections of the very poor countries of Asia, Africa, and Latin America. A number of well-known development models have, in fact, been constructed on the assumption that the marginal product of labor in agriculture is zero or negligible and that there would be little or no economic loss in shifting labor from agriculture to industry in the initial stages of development (38,46). Empirical work has thrown doubt on this assumption (28,43). However, while there are few economists who believe that the marginal product of labor in agriculture is zero, there is an increasing presumption that it is very low and that, under some circumstances, it would be possible to reorganize agricultural production so that the same output could be obtained with fewer laborers (30,51). Reorganizing agriculture so that it allows a higher level of productivity per worker is a high priority. Such reorganization is extremely difficult, however, in the face of rapid population growth. According to Myrdal, the pressure of population growth leads to a tendency to reorganize economic relations so that jobs are given to all members of the social order, even if, in the process, the average productivity of labor in the system is reduced (40). Thus, one of the important effects of rapid population growth is to make it more difficult to significantly improve agricultural productivity. The discontinuous improvement in agricultural technology represented by the "Green Revolution" may help to offset this effect of rapid population growth. However, this new technology, unless carefully controlled to avoid the excessive use of labor-displacing machinery, threatens to exacerbate problems of income distribution and lack of jobs.

<sup>5</sup> The literature on female labor force participation and fertility is lengthy. A good overview is contained in the report by the United Nations (58, pp. 303-309).

The other side of the productivity coin is the problem of labor absorption. Rapid population growth forces the economy to accelerate the generation of employment opportunities for the people of labor force age who want jobs (13). Aside from the definitional problems of "employment" and "output," it is possible that a considerable amount of unnecessary "work sharing" occurs within extended families and communities. For example, two brothers work on a farm that could yield as much per acre if worked by one person, or three people operate a shop which two could manage. In this case, it is not clear whether or not an increase in the number "employed" represents an increase in productive capacity. By almost any definition of employment, however, rapid growth of the population of labor force age will complicate the problem of job creation, especially when meaningful and well-paid jobs are demanded.

To conclude the discussion of the effects of rapid population growth on the quantity of labor, it is worth mentioning that the goal of providing full employment and increasing productivity inevitably implies that there will be a tendency for wages to rise. From the point of view of the policymaker, wage increases associated with full employment and increasing labor productivity ought to be welcomed as a sign of a healthy economy. From the perspective of employers, however, rising wages threaten profits and are thus likely to be opposed by some elements in the business community. There may even be opposition to fertility reduction on the grounds that it may lead to increasing labor scarcity. A former prime minister of Japan was recently quoted in an Indian newspaper as explaining that fertility in Japan had been reduced too much, as evidenced by the growing scarcity of labor and rising wages. Most of the developing countries would prefer the problem of too many jobs and excessively high incomes for the working class to the current problems of scarcity and subsistence.

Population growth also affects the *quality* of the labor force. Quality is more difficult to measure than quantity, but clearly the skill level, the motivation, and the organization of the labor force have pronounced effects on the output that a given number of workers can produce (50). Very rapid rates of population growth tend to reduce the average educational levels of the population and probably have an adverse effect on obtaining the other kinds of training that help determine the effectiveness of the workers (31,37,59). For example, the child of a very large family is unlikely to have as much contact with and training from his parents as would a child from a smaller family. On the other hand, the effects of population growth on levels of motivation may be either favorable or unfavorable to economic growth. Under some circumstances, institutions such as the land tenure system that have an unfavorable effect on motivation may be strengthened by rapid population growth (40,41). In the face of a growing labor force and a limited number of employment opportunities, the institutions of society develop mechanisms to spread the available work and income. One of these reactions may be a generally less effective pattern of work. On the other extreme, writers such as Boserup (7) or Hirschman (29) argue that, under some circumstances, the existence of rapid population growth makes people work more effectively just to keep even and that this effect may be an important factor pushing the developing countries to break out of their old patterns of doing things.

2. *The supply of capital.* Capital formation is the process of accumulating the nonhuman resources which are required in the productive process. Capital—the tools, machinery, buildings, roads, and stocks of raw materials—is a key element in the process of economic growth. How important the role of capital is relative to the growth of labor or technological progress is still a matter of debate (17,26). Learning to use existing tools better or developing more effective tools may be a more efficient path to development than accumulating more of the same tools. But, accumulation of capital, in old forms or in new, must by all accounts have an important role in development. New agricultural equipment and new factories are what hold much of the promise of higher levels of output for the future, and the accumulation of such tools is capital formation. Capital formation, in turn, depends on the ability of a society to economize in the use of goods and services for consumption and to direct what is not needed for immediate consumption into savings and investment.

Population growth has important implications for the rate and form of capital accumulation, with saving behavior at the heart of the argument. Here again, there are several schools of thought. The most commonly advanced argument is that a rapidly growing population of the Type II variety will have more difficulty saving than the more moderately growing population of the Type III variety. The more rapidly growing population will have a much higher burden of dependency,<sup>6</sup> defined by the proportion of people outside the labor force, and, thus, the persons who are working will have to devote a larger proportion of their earnings to providing their families with the basic requirements of life—shelter, food, and clothing. Accordingly, savings rates will be lower in this kind of population than in the more moderately growing population, and the slow rate of saving leads also to a low rate of capital formation.

The counterarguments are significant. There are many possible reactions to population growth in addition to reduced capital formation. One possibility is that people may save not just a residual part of their income, but rather a targeted amount that may, among other purposes, be intended to pay for the education and other needs of their children. That is, the existence of a large proportion of children in the population and growing total population may press the adult members of the population to increase saving and, possibly, to work more intensively than they otherwise would. Thus, depending on the theory one chooses to espouse, it is possible to argue that population growth affects capital formation either positively or negatively. The debate revolves around empirical questions, but the fact is that there is very little evidence that will support either position. From data on variations in international savings rates, Leff (35) has produced some evidence that capital formation, or at least the rate of saving, as a function of the age structure. There is some corroborative evidence from studies of household budget behavior, but the evidence is, as yet, incomplete. Intuition and the inadequate data that are available support the theory that, at least under conditions of great poverty, high rates of population growth affect savings adversely, but our

<sup>6</sup> For an overview of the dependency hypothesis, see the report by the United Nations (58, Chapt. 13).

knowledge is too incomplete to give us much faith in estimates of the magnitude of the effect.

3. *Technological progress.* At one time, scholars and planners tended to think of capital formation as the driving force behind growth in the per capita output of goods and services. More recent statistical evidence seems to indicate that substantially less than half of the variation in the rates of growth of per capita national income is explained by the rate of capital formation. Many alternative variables have been advanced to account for the remaining unexplained variance. Most can be considered to be either improvements in the factors of production—in the *kind* of capital or the *quality* of the labor force—or improvements in the way in which existing capital and labor are combined in the productive process. Both of these phenomena are forms of technological progress. Technological progress may be the chief factor determining the rate of growth of national output. What is the direct effect of population growth on technological progress and the indirect effect through technological progress on economic growth?

The answer to that question is that little is known; tentative conclusions suggest that the double impact will differ greatly from one country to another and from one sector to another. In those countries with an industrial economy and a relatively well educated urban labor force, it may be that a moderate level of population growth increases the size of markets, encourages the adoption of more modern technologies, and thus improves productivity. In a poor and densely populated agrarian economy, on the other hand, rapid population growth may have the opposite effect. More farming units on a limited land area may lead to deterioration in the quality of the land, lower levels of labor productivity, and a greater aversion to the risks of innovation. Thus, it is possible to justify any one of several positions on the likely impact of population growth on technological progress depending on the precise case chosen. Boserup (7), Clark (8), Hirschman (29), and Simon (55) have argued, for example, that, at very early stages of development, population growth may force the adoption of more labor-intensive techniques in agriculture and thus lead to greater productivity, as occurred in the shift from slash-and-burn to settled agriculture. Myrdal (40) suggests that, in areas with high rural density, population growth may lead to lower standards of work effort. Each may be correct because they are referring to different cases. In the contemporary world of scientific specialization, it is the operationalization rather than the generation of new technology that may be most seriously constrained by the size and rate of growth of a population. For example, poor countries can borrow technology, but the ability to innovate may require capital and an educated work force as well as a more subtle but important freedom from immediate subsistence pressures.

Technological adaptation hinge, in this case, on the responses of noneconomic institutions to rapid population growth—the family, the government, the class system, the universities, etc. For example, the government may concentrate its resources in immediate employment generation, however short term, at the expense of developing coherent long-run programs. Consequently, due to the diversion of decisionmakers and investment funds elsewhere, government intervention in technological innovation may be impeded. Thus, both directly through the economy and indirectly through other institutions, rapid population growth

affects technological progress. In situations of very rapid population growth, resource scarcity, and poverty, that influence is likely to retard technological innovation and thus the growth of the GNP.

4. *A Summary of the Economic Effects of Population in LDCs.* What then, on balance, is the effect of population growth on the factors of production and on the growth of total economic activity in an underdeveloped nation? If we draw our conclusions by comparing the Type II and the Type III populations as described earlier, then, initially, the proportion of the population in the labor force will be less in the Type II country with rapid growth, but the more rapid rate of population growth will soon help it to overtake the size of the labor force in the country with the slower rate of growth. The quality of the labor force will probably be lower in the rapidly growing population. The level of capital formation will probably be somewhat lower in the country with the higher population growth, and the rate of technical progress will probably also be slower. In sum, then, we would expect that the country with rapid population growth will derive little or no advantage in terms of the growth of aggregate output relative to the country in which the population is growing slowly. The exact result depends on the circumstances of a given country. In general, the poorer a country is in the initial stage and the fewer special resources it has, the less advantageous will be population growth. As mentioned before, the adverse effects of population growth are even more pronounced in per capita terms.

The advantages of a low rate of population growth are even greater if we consider the effects of *shifting* the fertility patterns from those of Type II to those of Type III, for, during the first 15 years after the shift, the rate of growth of the working age population will be unaffected. Only the number of children who are dependents of the system will be changed. Thus, there is a period of change when the country, in the process of transition from one pattern to another, may enjoy the advantages of both worlds.

It is important to put the arguments advanced thus far into perspective. All of the effects I have presented may be outweighed by other factors. Political reform or an improved export situation may have greater effects on a society's production of goods and services per capita than will the rate of population growth. More-over, these factors will certainly have a more immediate effect on economic activity than will population growth. Any developing country which seeks to improve its standard of living should recognize from the start that the policies leading to economic growth and the policies leading to population control are not substitutes for each other. Population growth does have important consequences for economic growth, but it is only one among many such factors (45).<sup>7</sup>

### C. *The Contrasting Situation of the Developed Countries*

The situation in the developed countries contrasts sharply with that in developing countries. The most salient difference between the two situations is that the rate of population growth is on the order of three to five times greater in the developing countries than it is in the developed countries. In the developed countries, the question of population growth has tended to be raised in terms of whether or not

<sup>7</sup> It is interesting that the Soviet economists are very much of this view (25).

there should be any growth, while, in the developing countries, the debate centers on the question of how important it is to reduce fertility from the current very high levels. As a result, the problems that are associated with population growth differ in the two situations. For example, the chief problem in the developed countries is the effect of population growth on the utilization rather than on the expansion of capacity.

First of all, a number of distinguished scholars have argued that the level of demand in the individual countries may be favorably affected by population growth. The low rate of population growth (in the United States) was often cited in the early Keynesian literature as having been a contributing cause of the depression (27).<sup>8</sup> The argument was basically that a growing population had a built-in tendency to increase the level of demand. Especially, it was thought, the demand for child-related activities—schools, housing, etc.—would be positively affected. Usually, the specifics were glossed over very quickly by exponents of this position. There was little evidence presented to show that people who had more children would spend more or that the loss of expenditures on child-related consumption items might not be offset by gains in other industries in the absence of high rates of population growth. The Commission on Population Growth and the American Future (12) has recently reviewed this position, and they conclude:

We have looked for, and have not found, any convincing economic argument for continued national population growth. The health of our economy does not depend on it. The vitality of business does not depend on it. The welfare of the average person certainly does not depend on it. In fact, the average person will be markedly better off in terms of traditional economic values if population growth follows the two-child projection rather than the three-child one.

A second economic problem area related to population growth in the United States and other advanced countries is the effect that population growth is thought to have on the environment. It is almost trivial to observe that, in the long run, the United States and other developed countries will have to reduce their population growth rates. But the short-run impact of population growth on the environment is not a matter of agreement. Certainly, population growth is not the major cause of the air and water pollution which are such a central concern to environmentalists.<sup>9</sup> The guilty parties in such cases are the technology used by industry, the kind of consumption patterns that we have adopted, and our high level of affluence. A reduction in population growth will have very little immediate impact on the incidence of pollution.<sup>10</sup> This is not an argument for population growth, rather, it is only an attempt to recognize where possible solutions might lie. Population growth is not the only problem of either the developed or the underdeveloped world, and population control will not, by itself, solve the problems of either.

<sup>8</sup> See 58, pp. 462–463, for further references.

<sup>9</sup> Paul Ehrlich (20) has been the chief proponent of the view that population growth is the chief cause of our environmental problems. Notestein (42) presents a contrasting view. The authors of "The Limits to Growth" (39) reach the conclusion that population growth, among other factors, is a major potential problem, but the Club of Rome itself seems to be reconsidering its endorsement of these findings.

<sup>10</sup> The Commission on Population Growth and the American Future (12, Chapt. 5) has reached a similar conclusion.

An important and related question is the manner in which a reduction in the rate of growth of population is brought about. Should the reduction be made instantaneously or should it be gradual? Frejka (23) has given a very clear answer to this question. If we were to attempt to reduce the population growth rate to zero immediately, we would create a set of very difficult demographic conditions. Because of the present age structure, even replacement level reproduction (i.e., slightly more than two children per couple) would lead to a positive growth rate for the next 50 to 60 years. To reach a zero growth rate with the current age structure, couples would have to have fewer than two children on average per couple. At some later time, when the reproductive cohort has declined and there are more deaths due to the larger number of people in the high-risk older ages, women would have to have more than two children to keep the population constant. These swings in fertility would, through their effects on the age structure,<sup>11</sup> create immense and, to some extent, unpredictable social problems. It is on this ground that many demographers and economists have cautioned against a too rapid move toward zero population growth. Under present circumstances, the point may be moot since fertility has been very near replacement levels for the past 3 years.

In 1972, the Commission on Population and the American Future concluded that there are few, if any, problems in the United States that would be more easily resolved with a more rapid rate of population growth and there are many problems the resolution of which would be more difficult. But, as indicated by their position on the environmental impact of population growth, they do not feel that population growth is the basic cause of most contemporary problems of the United States. Thus, while this impartial and careful Commission sees population growth as having negative consequences in the United States, the problems do not seem to be of the same order of magnitude as those in developing countries.

### III. AN ECONOMIC VIEW OF THE DETERMINANTS OF POPULATION GROWTH

My previous discussion stressed the consequences for the economy of different rates of population growth. However, since both mortality and fertility are affected by economic conditions, our understanding of the interdependence between economic well-being and population growth will be incomplete without some consideration of the economic determinants of population growth. Moreover, this topic has taken on a special importance in the light of the recent post-Bucharest trend to view socioeconomic development and not family planning as the key to fertility reduction. I will examine first the effects of economic development on mortality and, second, the potentially more important effects on fertility.

The principal explanation for the rapid rates of population growth prevailing in the developing countries is the fall in the death rate. On the one hand, there seems to be some reason to believe that changes such as diets improved by better

<sup>11</sup> The past history of fertility fluctuations in the United States has already left us with a legacy of social and economic problems (see 19, 34).

communication and transport, protected water supplies, and other public health advances have contributed to the mortality decline, and these advances are themselves the product of improved economic conditions. Thus, the improvement in economic conditions, through its effect on mortality, has been one of the contributing causes of the acceleration in the rate of population growth. On the other hand, it can be argued that the decline in the death rate is, to a large extent, a technological curiosity and not an economic phenomenon. The introduction of vaccination, malaria control, and other relatively low-cost forms of disease control perfected in the West have been major factors in reducing mortality. These remedies and their application were not dependent on improved economic conditions in the recipient countries. While the decline in mortality is the result of many events converging in the modern era, improvements in technology alone might have brought about much of the decline.

The effect of economic conditions on fertility depends on the time period under consideration, on the level of aggregation of the data under examination, and on a wide range of other conditions. It has been observed that, in the long run, fertility declines<sup>12</sup> during the process of modernization from the high levels congruent with the old mortality patterns to new levels which, in general, permit a rate of population increase somewhat less than 1% per year. Or, in terms of my earlier examples, fertility declines from the level in the Type I and Type II populations to that in the Type III population. This decline has taken place in all of the presently developed countries and it seems to be taking place presently in some of the developing countries such as Korea, Costa Rica, and China. The fact of the decline is clear, but the origins are only partially understood.

A country is demographically modern when both low mortality and low fertility have been established. What is unclear at present is whether or not those countries that have experienced only the reduction in mortality will indeed have the same experience of fertility reduction which has already transpired in the developed countries. Given the unprecedented speed of the recent mortality decline in the poor countries and its partially exogenous origin, the long-run pattern observed in the developed countries may not be repeated in developing countries.<sup>13</sup> Despite an improvement in the standard of living, fertility may not fall. More important, we do not know how long increases in per capita income can be maintained with the rapid rate of population growth being experienced in many of the currently developing countries. Thus, the seemingly painless solution to the problem of rapid population growth which the demographic transition paradigm suggests may prove to be no solution at all. This dilemma is one of the major reasons for attempting to introduce a population policy to reduce fertility. If fertility does not decline, and if economic growth is unable to maintain a pace

<sup>12</sup> See the report by the United Nations (58, Chapt. 4) and the report by Coale (9). This pattern is not universal. There have been many situations in which development was accompanied by a rise in fertility. Some disease control has a positive effect on fertility (see 56), on the effects within the family, (see 37).

<sup>13</sup> For a discussion of the difficulties developing countries will experience in seeking to duplicate the experience of the developed countries, see the reports by Arriaga (3) and Teitelbaum (57).

sufficient to provide for the rapid increase of the population, then the result may be either a gradual or a disastrous rise in mortality.

The existing economic research on fertility has been characterized by an assumption that fertility is the outcome of a rational process of choice. If people are having many children it is either because the parents want them or because the alternatives to having children are unknown or worse. Fertility decisions can, in other words, be treated as the outcome of a decision process by which the family unit chooses to allocate its scarce resources among both children and other consumption choices. The number of children in the completed family represents the parents' best judgment as to their relative demand for children as opposed to other consumption possibilities. Thus, to change fertility behavior, it is necessary to alter the structure of rewards and punishments associated with having children. I will examine three possible applications of the economic approach, differing in the degree of intervention they presuppose, and then will contrast them with one non-economic approach.

The economic framework suggests that demographic transition can be treated as a historical process in which the structure of rewards as altered as economic development reoriented economic activity away from the "agricultural" to the "industrial" and the "urban." This change in the economic orientation of the society leads both to a reduction in the level of child mortality (and consequently the number of children a family needs to achieve its desired family size) and to a reduction of the economic and social importance that children have in the lives of their parents. A conflict develops between the traditional large family and the new responsibilities of an urban industrial society. It is no longer possible to employ children directly "on the farm" or in the father's occupation, it costs more to rear them, and family-building activity conflicts with other ways of using time. For example, a woman's role as mother can conflict with her role as paid worker. Some of the pleasures that a farm family would have received from having many children are replaced by the wider set of consumption alternatives available in the urban setting. Thus, it is thought that, as these changes take place, fertility declines and leads to lower rates of population growth. According to this approach, access to contraceptive knowledge is not assumed to be a central problem, nor is government assumed to have a large direct role to play. Rather, the responsibility of government is to seek the most rapid possible rate of economic development.

There are still individuals and governments that adhere to the strict interpretation of the demographic transition model expressed above. However there is an increasing recognition by some economists that it may be possible to indirectly alter the reward structure for childbearing without transforming the entire society and that such a program of selective change may, through its impact on fertility, accelerate the rate of growth of per capita income. A number of such modifications have been suggested. One of the most frequently advocated changes is to upgrade the basic status of women either through programs to encourage their employment outside the home or through expansion of educational opportunities. As women's horizons expand, they may find childbearing relatively less gratifying (24). A second type of selective social change is the reduction of infant mortality.

An increase in the probability that a child will survive makes it possible for a family to achieve its family size goals with fewer births (49). It has also been suggested that an improvement in income distribution will help reduce fertility. As a larger share of the population benefits from economic development, they will feel a sense of participation and will be more willing to seek to improve their lot through all possible means, including fertility reduction (33,47).

Any of the changes suggested above, once implemented, may indeed lead to major reductions in fertility. The problem is, of course, that they are very difficult to implement. For example, given circumstances under which it is extremely difficult to find jobs for men, a traditional society may not find it easy to generate modern jobs for women. Moreover, many of the changes that have been suggested are more properly viewed as goals rather than as instruments of policy. An equitable income distribution is an important stated goal of policy in many countries already, and it is not likely to be easier to implement just because there are some desirable side effects on fertility.

A third economic proposal for altering the reward structure is the suggestion that parents should be given incentives for using contraception (21,32,44,48). India has pioneered in the use of incentives for the adoption of sterilization. A similar direct form of intervention is to change the rules for maternity leaves, educational benefits, and the tax structure so that parents are directly sanctioned if they have more than a stated number of children. Singapore has made use of this approach to fertility control during recent years.

The above approaches to fertility tend to begin with an economic model of fertility behavior. An alternative, or at least a complementary approach, is provided by traditional family planning programs. These programs begin with the assumption that parents are having more children than they really want, in large measure because they do not have access to modern contraceptives. Within the family planning framework, the solution is clear: assure easy access to contraceptives and fertility will be reduced. This was the logic of the early family planning efforts to set up clinics throughout the rural areas in India. It is also the rationale behind the current effort by USAID to encourage experimental efforts in contraceptive saturation. However, the family planning approach, in contrast to the economic approach, neglects the basic motivations involved in fertility decisions.

It should be noted that one problem economists have had in justifying their approach to fertility has been in explaining why parents persist in maintaining high fertility although the society as a whole would be much better off if fertility were reduced. The most common resolution has been to suggest that there are externalities involved in fertility decisions (16). By this, economists mean that not all of the costs or benefits of raising children are borne by the parents. Examples of costs borne outside the parental unit are the provision of educational and health services by the society at large, the displacement of new entrants to the labor force, and, possibly, the provision of assistance by other members of the joint family unit. Such cost-sharing provisions built into the social structure make it less costly for parents to add to their family size. Thus, there may be a real divergence between the costs of children to the parents and the costs to the society as a whole.

A complete view of the relationship between population growth and economic

behavior can only be achieved by treating the two phenomena in the same context. The general form of the interaction is clear. On the one hand, the rate and form of population growth help to determine the capacity of the economy to produce desired goods and services. On the other hand, the level of economic activity is a major determinant of fertility and thus the rate of growth of the population. A number of attempts have been made in recent years to formalize the set of interactions in simulation models (4). The success of such modeling is greatly restricted by the limited availability of empirical information that could be used as inputs, and it is probably fair to say that these models have been used more as instructional devices than as instruments of research.

#### IV. TOWARD A POPULATION POLICY

What, then, is the case for population control programs in developing countries? In the first place, the choice of a policy depends very much on the goals that the nation sets for itself (52). Thus far, I have concentrated my attention on the effects of population growth on the total amount of economic activity. This total could be reasonably well measured by the gross national product (GNP). The growth of the GNP, however, is only one of the goals of government policy. Many countries have shown more concern for per capita GNP (i.e., the standard of living defined as the total output of goods and services divided by the size of the population) than they have for the total. When the goals are stated in per capita terms, the importance of population growth comes into focus. For even if population growth has no effect whatsoever on the total GNP, by definition it has an effect on per capita GNP. A 3% rate of population growth will require a 3% growth of the GNP just to maintain a constant per capita GNP, and it is obvious that any effort to increase the GNP per capita will require either a greater rate of increase of the GNP or a lower rate of population increase.

Thus, while the high rate of population increase prevailing in many of the developing countries probably does have a mildly adverse effect on the growth of the total GNP, the principal force behind the argument that policymakers should pay attention to population control as a means of improving living standards is that living standards are, by definition, in per capita terms. Thus, a reduction in population growth rates has its impact through the effect both on the rate of growth of the GNP and on the reduction in the number of people for whom that income is intended.

Governments tend to have other goals of economic policy as well, one of which is full employment. I have already alluded to the role rapid population growth plays in reducing the probability that all members of the population can find meaningful employment. An improved distribution of income is another goal of economic policy that may be adversely affected by rapid population growth.<sup>14</sup> Another relevant policy goal may be improved health or education standards. I would argue that all of these goals will be reached more easily in a situation of low or moderate rates of population growth than they will in the situation in which the rate of growth is high. The major element in any population control program is

<sup>14</sup> There are very different opinions on this matter. For conflicting views, see the reports by Bogue (6), Davis (15), and Freedman and Berelson (22).

fertility control. Migration on a large scale is not feasible. A deliberate increase in mortality would be unthinkable and, for many reasons, would be likely to be counterproductive even if it were acceptable. Consequently, fertility control programs have been introduced in many countries of the world.

Will such programs (14) work? The answer is, in short, that they will have some effect, but they take time, and, as emphasized above, they should not be thought of as a replacement for more direct policies to aid economic growth, but rather as a substantial aid in helping to achieve those ends.

A more important question is whether or not population control programs as presently constituted are the most effective programs available for the money or whether or not they are being undertaken at the appropriate scale. The response to both parts of this question is less than favorable. The evidence seems to be that present programs are inadequate in many respects. As currently structured, they are hampered by administrative problems (53) and weak motivation (14,56) among the target population. Moreover, it can be argued that, given the immense magnitude of the problem they are designed to solve, almost all of the currently existing programs are constrained by lack of funds, first-rate personnel, and other resources. With some reform, more political support, and additional expenditure, they could achieve a great deal more than at present. Their impact would be greatly enhanced if they were combined with other effective programs of social and economic development.

## V. CONCLUSION

Readers of the previous pages of this essay may want to cry "Malthusian." Most of my discussion has concerned the disadvantages of population growth as it affects the economy. But these remarks should not lead one to the conclusion that population control is the principal or the only way that a country should be attempting to raise its standard of living. Rather, population control is an approach to the problem of development which conflicts to only a small extent with the alternative programs of industrialization and social and political reform that, in and of themselves, may be more important than population control. Nor should population growth be used as a simple screen to hide the urgent need for economic and social reform in many parts of the world. There has been an unfortunate tendency for scholars and administrators in this modern world to look for single solutions to problems. The problem of poverty is not likely to be resolved so easily. Certainly, population control itself will not be a solution. Unfortunately, it may also be true in some situations that industrialization and institutional reform will not solve the problem of poverty.

Thus, the rapid population growth experienced in the modern era may indeed make it more difficult for us to achieve many of our economic goals. Under such circumstances, an active population policy may be one of the elements in the program designed to accomplish these goals. Population control programs are only one of the possible means to the end of a better life for mankind; they are hardly an end in themselves.

Population growth is most important as a long range phenomenon and its influence diffuses throughout the economy or the society in which it takes place. As a result, it is often difficult to see its effects. But, because of these characteristics, it

should not be thought that population growth is unimportant. It is also true that the seasons of the year change slowly and that their effects are diffused throughout the world of nature, but who would suggest that winter's impact is negligible? The strength of modern economics is in its ability to deal with relatively short-run phenomena of limited influence. Economics also has much to say about long-range phenomena, but, given the difficulties in testing theories about the long run, there is, naturally, considerably less confidence in their predictive or interpretative strength. It would be tragic if our concern with the immediate should lead us to ignore the profound issues of alternative futures.

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