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Interrelations Between Population, Employment, And Economic Development: A Bibliography*

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The heart of a science has been defined as a set of "puzzles" or problems which members of the discipline feel are suitable for research.¹ These puzzles are judged to be suitable for research because (influential)

*This bibliography grew out of a RTN seminar I organized at the ADC offices in New York, December 2-3, 1971. The participants included Richard A. Easterlin, University of Pennsylvania; James E. Kocher, Population Council; R. Marvin McInnis, Queen's University, Ontario; Warren C. Robinson, Pennsylvania State University; T. Paul Schultz, University of Minnesota; Wayne Schutjer, The Ford Foundation; Ismail Siragel-din, Johns Hopkins University; and Michael P. Todaro, Rockefeller Foundation. Many of the references are from the reading lists of courses taught by the participants. The brief introductory statements draw heavily on my interpretation of the discussion at the seminar. Others who provided reading lists or comments on the bibliography include Ansley J. Coale, Robert Dickler, John Durand, Henry H. Gemery, and Harvey Leibenstein. Responsibility for the final form of the bibliography is mine.

¹ Thomas Kuhn, *The Structure of Scientific Revolutions* (Chicago: University of Chicago Press, 1962).

members of the discipline feel they are interesting and capable of solution.² Only fairly recently has the study of population begun to be considered a suitable area of research or "puzzle" for economists.

Just over a decade ago it could be said that the typical treatment of population growth in economic theories was as an exogenous variable,³ and the study of the determinants of population growth in the social sciences was almost entirely within the purview of sociologists. Economic models which dealt with population generally introduced an assumed population trend as datum. More recently the "population explosion" and concern over the consequences of continued rapid

² Benjamin Ward, *What's Wrong With Economics* (New York: Basic Books, Inc., 1972), p. 16.

³ Richard A. Easterlin, "The American Baby Boom in Historical Perspective," *American Economic Review*, Vol. LI, No. 5, December 1961, p. 869.

population and labor force growth on levels of living and rates of economic growth have stimulated research by economists on the determinants and consequences of population growth. The most recent upsurge in interest has been associated with research in the areas of human capital, allocation of time, a household production function, and a household decision model.⁴

The recent interest in population by economists could potentially help remedy an important shortcoming of demographic models which one observer has characterized as follows:

... demography has a long history of the building of models of population change and description, (but) these are closed system models in which population and *only* population parameters appear. Models which include socio-economic variables appear to be largely lacking. Developing such models clearly presents tremendous problems but a start will not be made on them until it is accepted that this *is* an aim, that the development and testing of such models is *the problem*.⁵

However, if economists are to make a contribution toward this problem, i.e., developing models which include socio-economic variables, they need to build on the conceptual⁶ and empirical contributions which sociologists and demographers have made. Furthermore, economists need to remember that the same behavior is often influenced by both economic and non-economic factors and to resist the temptation to assert the primacy and universality of economic factors as determinants of demographic change.⁷

⁴ See the proceedings of the Conference on New Economic Approaches to Population Questions, sponsored by the National Bureau of Economic Research, New York, June 8-9, 1972, forthcoming as a supplement to the March/April 1973 issue of the *Journal of Political Economy*. It is interesting to speculate on the causes of the increase in economic research on population along the lines of George Stigler's article, "The Influence of Events and Policies on Economic Theory," *American Economic Review*, Vol. L, No. 2, May 1960, pp. 36-45.

⁵ Frank Bechhofer, *Population Growth and the Brain Drain*, (Chicago: Aldine Publishing Company, 1969), p. 13.

⁶ J. E. Meade, et al., in "Demography and Economics," Supplement to *Population Studies*, May 1970, p. 30, mention cohort analysis as an important conceptual contribution of demographers in recent years. Cohort analysis is defined as quantitative description of data occurrences from the time a cohort is exposed to the risk of such occurrences. Period analysis, on the other hand, involves a quantitative description and analysis of the data for the many cohorts observed during a specified time interval, such as a year, with respect to some variable. (Henry S. Shryock and Jacob S. Siegel and Associates, *The Methods and Materials of Demography*, U.S. Department of Commerce, Bureau of the Census, 1971, p. 712).

⁷ See Uriel G. Foa, "Interpersonal and Economic Resources," *Science*, Vol. 171, January 29, 1971, pp. 345-351 for a discussion on noneconomic resources and their interaction with economic resources in determining human behavior. R. A. Easterlin cites several clear examples of non-economic determinants of fertility in "The Economics and Sociology of Fertility: A Synthesis," prepared for the Seminar on Early Industrialization, Shifts in Fertility and Changes in Family Structure, Institute for Advanced Study, Princeton, New Jersey, June 18-July 9, 1972.

The role of demographic variables in economic change can be illustrated within the framework of the aggregate production function.⁸ The (per capita) labor input can be viewed as the product of average weekly hours times the participation rate. When the participation rates are broken down by age, sex, and marital status, the effect of economic and demographic factors, such as education or changes in fertility which influence labor force participation rates, become more obvious. The potential size of the labor force depends on past fertility, age-specific mortality, and migration movements. Changes in the labor force can also be analyzed in terms of its regional, industry (including farm and non-farm) and occupational components. In terms of the occupational distribution, changes can be viewed in terms of factors influencing the occupational composition within industries such as technical change and factors affecting the relative importance of industries with different occupational mixes such as income elasticities of demand.

The size and composition of the capital input is also influenced by demographic factors. The savings ratio is influenced by demographic variables⁹ as is the capital-labor ratio. The composition of the capital input, e.g. residential housing and utilities versus plant and equipment, also depends on demographic variables. Finally productivity growth is influenced by industrial, occupational, and regional reallocation of labor (and capital).

In all of these cases, decisions made by households may simultaneously determine labor force participation, marriage, fertility, savings and consumption patterns, migration rates, and other variables. Decomposition of population change gives a better understanding of the nature of changes in the total population and of variations over time. An example of such disaggregation is the framework used by Easterlin in analyzing the components of growth in American population, labor force, and households.¹⁰ He found it convenient to group the components of change as follows:

⁸ Variations in composition and level of aggregate demand are also integrally tied up with demographic change. See R. A. Easterlin, "Economic-Demographic Interrelations and Long Swings in Economic Growth," *American Economic Review*, Vol. LVI, No. 5, December 1966.

⁹ See for example Nathaniel H. Leff, "Dependency Rates and Savings Rates," *American Economic Review*, Vol. LIX, No. 5, December 1969, pp. 886-896 and the literature on the life cycle hypothesis of savings.

¹⁰ R. A. Easterlin, *Population, Labor Force, and Long Swings in Economic Growth* (New York: National Bureau of Economic Research, 1968), p. 59.

<i>Population</i>	<i>Labor Force</i>	<i>Households</i>
1. Mortality rate	1. (a) Labor force entry 1. (b) Labor force exit (mortality and aging)	1. (a) Household formation 1. (b) Dissolution of households
2. Net migration rate	2. Net migration	2. Net migration
3. Fertility rate	3. Labor force participation rates	3. Household headship rate*

* The household headship rate is defined, along lines identical with that for a labor force participation rate, as the proportion of the population in a given demographic group (e.g. classified by age and sex) who are household heads.

An economic analysis of economic and demographic change can be much more revealing when the components of change are broken down in more homogenous groupings. Crude rates may be refined by making them specific for common characteristics such as age, sex, race, nativity, and marital status. In some cases adjustments in crude rates permit a closer approximation to probabilities by removing the population at zero risk or by taking account of the fact that for some population subgroups the risk is much greater than for others. Important changes in the components may be revealed when the aggregate is decomposed into its constituent parts. A simple example is the relatively stable labor force participation rate in the United States between 1900 and 1960 which encompasses rather striking changes for certain age and sex groups and especially for married women.

The purpose of this bibliography is to serve as the basis for a course or seminar pertaining to the demographic aspects of economic development. It is primarily directed to foreign graduate students from less developed countries who are studying economics or agricultural economics in the United States. Hopefully with some alterations the bibliography may be appropriate for use by the foreign students when they return to teach in their home country.

The topics included in this bibliography are: (1) labor force and unemployment, (2) migration, (3) fertility, (4) mortality and morbidity, (5) consequences of population growth, and (6) population policy and family planning. A few brief comments are made by way of introduction to each topic. The intention was to organize the bibliography so that the topics could be taken up in any order desired. An effort was made to include as many articles as possible that pertained to less developed countries and also to include articles that were widely available.

Important topics that have not been explicitly included are education and the distribution of income. It was felt that these topics could not be treated separately without expanding the bibliography beyond manageable limits. Other topics in demography not specifically included are historical demography and demographic methods. A good reference on demographic methods is *The Methods and Materials of*

Demography, a two volume work by Henry S. Shyrock, Jacob S. Siegel, and Associates (U.S. Government Printing Office, 1971). Another useful, if somewhat dated, general reference is the United Nations Department of Social Affairs, *The Determinants and Consequences of Population Trends* (New York, 1953). *Introduction to the Mathematics of Demography* (Reading, Mass.: Addison-Wesley, 1968) by Nathan Keyfitz is a text on mathematical demography.

Labor Force and Unemployment

The concept of the labor force in primitive societies where most of the workers are outside the wage sector is a difficult one; indeed the labor force is hardly distinguishable from the total population. At a low level of technology almost the entire population is engaged in producing the goods and services necessary for subsistence. With the growth of a market economy, the labor force becomes more clearly distinguishable as a labor market develops. Similarly, unemployment is meaningful only in countries where the level of employment is determined in the impersonal labor market. When the labor force is largely composed of self-employed or unpaid family workers, unemployment is hard to define.

What initially appeared to Western observers at first glance to be widespread unemployment in the less developed countries has often upon closer examination been revealed as productive activity. These productive activities include home production of transportation, marketing, education, public administration, religious ceremonies, entertainment, personal services, food processing, and provision of shelter and clothing. In some cases it appears that apparent unemployment may reflect enforced idleness due to illness. It now seems that the estimates of the opportunity cost of labor to the modern sector in most less developed countries were often too low and reflected an underenumeration of the goods and services produced in largely self-sufficient agricultural societies. Increased labor for the modern sector can be made available by making market produced goods more attractive than home produced goods but generally not at zero cost.

Demographic analysis provides a useful framework for development planning as it pertains to the potentially economically-active population. Projections of the labor force or the population in the prime working ages based on present levels and projected trends in fertility and mortality (migration and participation rates) provide an indication of the prospective need for new jobs. If labor force participation rates are available by age and sex, changes in these rates and induced migration may be estimated on the basis of expected trends in education, urbanization, household formation, fertility, and other variables. In countries with a significant urban population and which accept women working outside the home, female labor force participation and fertility are affected by (or determined simultaneously with) women's education. Education influences the opportunity cost of women's time and, as a consequence, labor force participation rates, the number and "quality" of children, the standard of living, and the allocation of resources within the home.

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Migration

Migration may be defined as a relatively permanent movement of persons over a significant distance, i.e. usually across civil boundaries. This includes international, internal, and rural-urban migration.

Data for measuring international migration are usually collected as a by-product of the administrative operations of border control, while information on internal migration generally must be derived from indirect information including censuses, vital statistics, and responses to questions about place of birth. Migration data may pertain to gross in- or out-migration or net migration; the period of the migration may range from lifetime migration to migration over a period of a year. Different measures are appropriate for different purposes, although the data often constrain the measures that are available.

Economic motives for migration are generally subsumed under differences in levels of (permanent) income. If wages are flexible, wage differentials are a proxy for income differentials; while if wages tend to be rigid, migration may respond to different levels of unemployment as increased specialization and division of labor impose more geographically concentrated and occupationally specialized patterns of employment on

a population distributed on the basis of criteria which are becoming obsolete.

Migration tends to be selective of certain age, sex, and educational groups. For example, if migration is viewed as an investment (including the actual physical costs of moving, job search, etc.), the young have a longer period over which to amortize the investment. Therefore migration rates for young age groups would show greater responsiveness to income differentials than migration rates for all age groups. Since labor mobility among occupations is imperfect, data on spatial migration within occupational (or education) groups may be more responsive to income differentials than net migration for all occupational (or educational) groups combined. While many studies of the determinants of migration focus on income differentials or proxies for income differentials, some have attempted to look at the more fundamental causes of income differentials and relate these to migration.

Studies of the consequences of migration indicate the possibility for a divergence between the social and private costs and returns to migration. Examples of this literature include articles on the "brain drain" and "over-urbanization."

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Fertility

Measures of fertility may be obtained from information on vital statistics or, where these data are unavailable or seriously incomplete, from censuses or surveys. There are many refinements of the crude birth rate or child-woman ratio which serve to provide a closer approximation to the probability that a woman exposed to the risk of conception will give birth to a child. These refined measures are important because they permit one to adjust for the differences in age structure, marital status, and parity (number of previous live births) which affect fertility. These standardized rates are useful in analyzing the socio-economic determinants of fertility; the crude measures are im-

portant in analyzing the consequences of population growth.

The simplistic and incomplete theory of the demographic transition does not provide an adequate explanation of fertility, but it does provide a framework within which the importance of mortality and especially infant and child mortality can be brought to bear on the fertility decision. Couples are generally assumed to make decisions on fertility in terms of achieving a given number of surviving children. Economists have assumed that the desired number of surviving children will depend upon tastes, income, and prices. While economists have traditionally neglected reasons for changes in tastes, sociologists have neglected the constraints imposed on parents by prices and incomes and the implications of these constraints for choice among alternatives.¹

Based on recent research in the areas of human capital, the allocation of time, a household production function, and a household decision model, it can be argued that conceptually, fertility is simultaneously determined along with marriage, labor force participation, migration, savings, consumption patterns (including the quality of children), and other variables.²

Finally it has been noted that:

. . . the economic analysis of fertility is a notably sexless subject. . . . Without reference to sexual intercourse one is hard put to explain why households would engage in the "production" of children once the number demanded is reached, and consequently why excess fertility would ever occur.³

Models which include only "goods" and children in the utility function do not reveal the interrelationships that exist among children, sexual intercourse, and contraception. Since children are a consequence of coitus, in the absence of contraception these two goods are joint products. Coitus in cases where there is a desire to avoid conception implies a demand for contraception. The demand for children, coitus, and contraception may be seen as the outcome of tastes, income, and the monetary and psychic prices of these goods. Viewed in this perspective, children may be wanted only in the sense that the demand for coitus and the monetary

and psychic cost of contraception is greater than the cost of children. Where this is the case, a reduction in the (monetary and psychic) cost of contraception would reduce fertility.

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² M. Nerlove and T. P. Schultz, *Love and Life between the Censuses: A Model of Family Decision Making in Puerto Rico, 1950-1960*, The Rand Corporation, RM-6322 (Santa Monica, California, September 1970).

³ R. A. Easterlin, "The Economics and Sociology of Fertility: A Synthesis," prepared for the Seminar on Early Industrialization, Shifts in Fertility and Changes in Family Structure, Institute for Advanced Study, Princeton, New Jersey, June 18-July 9, 1972, p. 3.

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Mortality and Morbidity

The decline in mortality in the developed and less developed countries is largely an unexplained phenomenon. In most cases the decline in mortality is taken as given and the role of "economic" and "non-economic" factors in the decline is unclear. In order to determine the relative role of economic and non-economic factors in the decline in mortality, a closer examination of existing data and the collection of more and better data are needed.

Mortality or death statistics are derived from the vital statistics registration system. These data may be adjusted so as to approximate probabilities of the risk of dying for any age cohort. An example is the infant mortality rate which is the number of children less than one year old who die during a year per 1,000 live births during the year. Cause-specific death rates which represent the percent of all deaths due to a particular cause or group of causes are another common basis of disaggregating mortality statistics. Gross mortality rates may also be decomposed by regions, for rural and urban areas, by sex, and by ethnic groups. All of these data, even though they may be subject to serious reporting errors, are potentially useful in analyzing the decline in mortality. Since the incidence of specific diseases is often concentrated in certain age groups, this may provide a rough check of the consistency of cause of death and age-specific mortality rates.

The role of choice in reducing mortality is more constrained than in fertility, although expenditures for medical services do appear to be responsive to changes in income and prices. Smoking represents an example where choice appears to affect mortality. The available evidence suggests that there are important interdependencies between economic and non-economic causes of the decline in mortality. For example, a decline in deaths due to malaria as a consequence of public health programs may be related to the level of food supplies as well as to the malaria eradication program.

Changes in morbidity appear to be associated with changes in mortality, and while there is little conclusive evidence on the matter, it would appear that declines in morbidity may have significant effects on labor productivity.

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The Consequences of Population Growth

It is clear that the consequences of population growth may also be the determinants of population growth. For example, a sustained decline in mortality that leads to an increase in population growth must ultimately result in a decrease in fertility. A completely satisfactory treatment of the consequences of population growth would require a general equilibrium

framework. Such a framework has not yet been developed although perhaps a start has been made.¹ Nevertheless, the literature in this section seeks to present possible adjustments to a decline in mortality and the consequent acceleration in population growth while recognizing that these consequences in turn feed back into the system and act as determinants. This literature may be viewed as an extension of the theory of the demographic transition, since it suggests that there are many (short-run) adjustments to a decline in mortality in addition to a decline in fertility and that, in fact, there may be a trade-off among these various adjustments based on their relative costs.

Research in this area has explored the various adjustments that are made to a decline in mortality, other events that may constitute a threat to established living standards (such as the Irish potato famine), or new opportunities the exploitation of which require changes in economic or demographic behavior.² The literature in this section analyzes the many adjustments that have been made to economic and/or demographic stimuli. These adjustments include political activity to alter the distribution of income, increased productivity to raise the level of income, increased migration, and decreases in fertility. The decreases in fertility may be achieved by alternate means, including delay of marriage, increased celibacy, increased adoption of various means of birth control, and/or increased abortion.

This literature tends to view economic and demographic change as more of an adjustment or response to a stimulus than a diffusion of new innovations. An important objective of further research in this area would be to examine the relative costs (or returns) to different alternative adjustments with the objective of explaining past economic and demographic change associated with modernization and possibly predicting the direction of future change.

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¹ See for example M. Nerlove and T. Schultz, *op. cit.*

² This research is analogous to a study made by Kindleberger of the different adjustments to the decline in the price of wheat in Great Britain, Germany, France, Italy, and Denmark after 1870. (Charles P. Kindleberger, "Group Behavior and International Trade," *Journal of Political Economy*, Vol. LIX, No. 1, February 1951, pp. 30-46).

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Population Policy and Family Planning

The often expressed goal of family planning is that children who are born should be wanted children, or alternatively that it should be possible for parents to

have the number of children that they want. In order to achieve this goal the government may take a role in providing information on the means of preventing conception, the provision of contraceptive services, and the development of improved contraceptive technology. This collective action is based on the premise that there may be barriers to the dissemination of information and contraceptive services and to the development of improved contraceptive technology (i.e. that the marginal private cost exceeds the marginal social cost). It is evident that in practice it may be difficult to make a clear distinction between measures which better enable parents to implement their own decisions (family planning) and measures which influence or modify the parents' decisions or affect the desired number of children (population control).

A case for collective action to influence the desired number of children is made where the fertility decision affects not only the parents, but older children in the family and others outside the family including future generations. There would appear to be some evidence that part of the costs (and benefits) of raising additional children may not fall on parents. One instance may be the cost of education. In the case where there are externalities, attempts have been made to estimate the net costs (or benefits) to society of an additional birth. These estimates are subject to many limitations, including for example the need to include the psychic income which parents receive from raising children, the problem of choosing an appropriate rate of discount, and the difficulty in determining the distribution of the benefits due to changes in fertility. Nevertheless, further research on the consequences of population change and the costs and benefits of additional births may enable society to devise better means by which to make the social costs emanating from fertility decisions into private costs for the couples making the decisions.

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