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Foreword

The *Population Bulletin of the United Nations* presents brief articles relating to population which, by their nature, do not require separate publication. Material for the *Bulletin* is selected in the light of the interests and needs of Governments, international organizations, research institutions and individuals engaged in social and economic research, as well as the public interested in population.

The first seven issues of the *Population Bulletin* were prepared by the Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat between 1951 and 1963. The *Bulletin* has now been reinstated as a United Nations publication in accordance with the endorsement and recommendation of the Population Commission at its eighteenth session, and, as in the past, it will be prepared by the Population Division.

It is expected that most of the articles to be published in future issues of the *Bulletin* will be prepared by the United Nations Secretariat in pursuance of the programme of work recommended by the Economic and Social Council and the Population Commission. Studies by consultants and reports of meetings organized by the United Nations, or excerpts from such studies and reports, may also be included. In addition, contributions will be solicited from the specialized agencies of the United Nations, the secretariats of the regional commissions and scholars.

CONTENTS

Articles

Meetings

Data sheet

EXPLANATORY NOTES

The following symbols have been used in the tables throughout the report:

Three dots (. . .) indicate that data are not available or are not separately reported

A dash (——) indicates that the amount is nil or negligible

A blank in a table indicates that the item is not applicable

A minus sign (−) indicates a deficit or decrease, except as indicated

A full stop (.) is used to indicate decimals

A comma (,) is used to distinguish thousands and millions

A slash(/) indicates a crop year or financial year, e.g., 1970/71.

Use of a hyphen (-) between dates representing years, e.g., 1971-1973, signifies the full period involved, including the beginning and end years.

Reference to "tons" indicates metric tons, and to "dollars" ($) United States dollars, unless otherwise stated.

Annual rates of growth or change, unless otherwise stated, refer to annual compound rates.

Details and percentages in tables do not necessarily add to totals, because of rounding.

NEW EMPHASES IN DEMOGRAPHIC RESEARCH AFTER BUCHAREST?

Léon Tabah *

PURPOSE

The objective of this article is not to prepare an inventory of needs for demographic research. That task has been done recently topic by topic.[1] Nor is it to review what some traditionally call the "state of the art", a kind of balance-sheet of procedures which specialists use. Rather, it is to discuss the extent to which demographic research appears to be affected by what has been a major event for the discipline, namely, the World Population Conference, held at Bucharest, Romania from 19 to 30 August 1974. At that conference, for the first time, representatives from virtually all Governments met to deal with world population problems.

The subject is approached less from the point of view of theoretical knowledge than from that of applied knowledge, stressing less the word "science" than the word "art", in the meaning which it has assumed since the thirteenth century, namely, that of a "body of knowledge and rules for action", a bundle of action-oriented processes more or less inspired by science.

It goes without saying that the author must, by the very nature of the subject, introduce his own value judgements and express views which are strictly personal and commit no one but him.

The problem is to determine the extent to which the general framework for demographic research, which is popularly termed the "paradigm" of the discipline [2]— that is, the articulated body of concepts, theories, techniques and values—has been modified or even challenged, following the conference at Bucharest, the essential characteristic of which was to introduce a political dimension into the field. Has one model been destroyed and another substituted? Did the introduction of politics cause an "epistemological rupture" which would lead to a reappraisal of the importance

and the scope of the discipline in the range of social sciences?

The general question may be subdivided into several others:

(a) Have new variables surfaced as others appeared obsolete? If so, to what extent have the rules of the art adopted so far been able to solve new problems appearing to politicians? Must not an entire series of concepts and techniques be reviewed?

(b) Does a reorganization appear indispensable in order to satisfy the wishes of the international political community? Should this reorganization tend to enlarge or to restrict the field? A new allocation of subjects within the discipline does not appear desirable, because all of the components cannot advance at the same pace indefinitely. If this is so, which ones must be promoted and which abandoned? Must the goals and the priorities be re-examined? Must the change be radical and must it entail a "return to square one", or should it be gradual, or nominal, because everything will resume as if nothing has happened?

(c) Demographers form a relatively small community, where communication is rather easy. Has their spirit been shaken? Are they going to change, or on the contrary do they still cling to archaic methods of thinking and acting? This conservative attitude will doubtless be seen among the most specialized, or among those who have acquired the most prestige in tasks that have led to a body of complex knowledge, and who, wishing to go even deeper, will, therefore, be reluctant to abandon it. Is not the change going to meet with a resistance from the establishment, ill-prepared to adapt itself to a new climate? And what about institutions that finance research when funds are becoming more and more scarce, and when the Conference has kindled a new interest in the problems of population and multiplied the appeals to them? Are the directions deriving from the Conference responsive to their expectations, do they fit with their own ideologies; or, disappointed, are the donors of funds going to change their minds and adopt other strategies? In some of his statements to the forum organized simultaneously with the Conference, the representative of a major foundation in the United States of America indicated an approach to the problem different from the one which has existed.

The interest and importance of these questions cannot be ignored and it was worth taking advantage of the Conference at least to pose them, even if one

* Director, Population Division of the Department of Economic and Social Affairs, United Nations Secretariat.
1 International Union for the Scientific Study of Population, "Research needed in the field of population", *The Population Debate: Dimensions and Perspectives; Papers of the World Population Conference, Bucharest, 1974*, vol. I (United Nations publication, Sales No. E/F/S.75.XIII.4), part three, pp. 385-89 (hereinafter cited as *Population Debate*).

2 T. S. Kuhn, *The Structure of Scientific Revolutions*, 2nd ed. (Chicago, Illinois, University of Chicago Press, 1970); M. De Vroey, "Une explication sociologique de la prédominance du paradigme néo-classique dans la science économique: économie et sociétés", Institut de science économique appliquée, serie H.S. No. 14 (Paris, 1972).

1

thinks that their implications will be less than some would like to maintain, or even if the change in orientation was in any case latent. A periodic self-examination is always a salutary exercise.

LESSONS OF THE WORLD POPULATION CONFERENCE, 1974: BROADENING HORIZONS

It is necessary then to begin by drawing on the lessons of the World Population Conference held at Bucharest in 1974. This has been done many times by various authors;[3] and, therefore, the discussion is limited to the main point. But, if one had to characterize this Conference in a few words, one would have to resort to "opening to the outside", "expansion" or even "breaking through". This impression is, indeed, that conveyed from several quarters, whether in the conclusions of the Conference or in the tone of the discussions. The major points made are as follows:

(a) The general philosophy of the Conference is interrelated with the notion that the population problem is so complex that it is linked with all the major problems faced by mankind, none of which can be considered separately. One would inevitably be led to false conclusions if one considered the particular problem of population independently of the larger framework in which it exists—that of the responses and the initiatives of society in the face of a rapidly changing world. It makes no sense to refer to demography in the abstract, without considering the sum of the conditions and macro-problems of the world. Also, population problems must henceforth be seen in their economic, social and cultural context, beyond the narrow limits of traditional demography. Demographic variables are now to be considered dependent upon economic and social development. Here, then, is the general principle which permeated the discussions. However, certain qualifications were imposed on this principle, and it was recognized that such changes in the demographic attitude can contribute to solving problems of development, especially when demographic pressures are strong or demographic structures aberrant;

(b) The Conference has enlarged the concept of population, giving it a political content. The real problem is not one of contraceptive techniques or antibiotics, but one of the organization of societies. The real dimensions of population problems are social and institutional. What must be reformed are societies, what has to be changed is life. But here again, no one questions that in matters of procreation, for example, by attempting to persuade couples while educating them, by succeeding in convincing them to adopt patterns of behaviour which are in their own interest, one can precisely contribute to modify society in the desired direction. In the background is the age-old idea that there is a reciprocal, circular link between the structure of the family and the structure of society, that any action on the one necessarily affects the other; or the idea that a people's fertility, its state of health and its geographical distribution are matters more social than physiological or physical, and that, therefore, technical solutions, however indispensable, are not enough. As for point (a), attention must be focused on the organization of society as a whole, without denying that an action at the micro-level can and must contribute also to a solution at the macro-level;

(c) The Conference was without doubt the clearest manifestation on a global level of the idea of intervention in the field of population. No text is more complete on this point than the World Population Plan of Action which was adopted by 136 Governments;

(d) The Conference recognized the global nature of population problems, especially as they relate to natural resources, notably food; and it espoused for the first time the concept of a world strategy;

(e) The Conference took into consideration some variables whose links with population had not previously been exhaustively examined, such as natural resources and the environment. With respect to these variables, it was influenced by the other major problems which have recently surfaced on the international scene, and remained faithful to the integrated approach taken in all major United Nations forums;

(f) The Conference fully recognized the principle of birth control, not so much for demographic reasons but rather as a fundamental right of couples who must not be kept in ignorance on the subject. Remaining consistent, it recommended a free and informed access to birth control means and services, while emphasizing less the direct than the indirect means (reduction of infant mortality, improvement of the status of women, promotion of social justice, judicious regulation of the age for marriage, development of education, old-age pensions etc.). The implementation of these direct means, and even more so the indirect means, is primarily the responsibility of the State;

(g) Clearly, many aspects of demography concern personal life, and, therefore, should be sheltered from market forces and speculation. The population problem, for example, differs from those of food or raw materials, where stocks can be built up against future contingencies. There are no laws of supply and demand in population, and notions of monetary cost appear secondary in the face of non-quantifiable values. Thus, the Conference stressed the "values" that make human phenomena intrinsically different from others, by reinstating problems of social justice or international justice in their historical perspective and by concerning itself with inequities more at the international level than within national borders. It did this by appealing for international solidarity, by linking the changes in the patterns of consumption in rich countries to population policies chosen deliberately by Governments, or by stressing the need to apply human rights principles, for example, to the protection of migrants.

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[3] Including the present author. See L. Tabah, "The significance of the Bucharest Conference on population", *International Social Science Journal*, vol. XXVII, No. 2 (1975), pp. 375-84.

2

The Conference in no way led to a radical rupture in relation to traditional thinking; one must, however, note that it repeatedly sought to widen, until they burst, the frontiers of the population concept.

The discussion has now reached the heart of the subject-matter: the extent to which the profession is ready to accept and to adapt itself to this all-embracing, global, multidimensional vision, which implies a profound change in which population problems are no longer given an exclusively technical and demographic meaning. In the past, the demographer posed and solved problems alone. The truths he arrived at were partial, but truths, none the less. While the philosopher or politician is preoccupied with the whole, the scholar is concerned with elements. Now he, too, is required to concern himself with the whole and to intrude into neighbouring fields. He was aware that the discipline had progressed considerably during the past decades. He was comfortable, settled in his paradigm, the fruits of which he shared with a few colleagues with whom dialogue was made easy by the limited scope of the research. And now what one asks of the scholar, who abhors confusion, is to broach not only demography but economics and sociology, to take into account the systems of values in force in the societies which he studies and to integrate such variables as environment, a field in which quantified indicators have been almost unavailable. Moreover, he feels his independence threatened because the structure of political power will henceforth have repercussions on the production of knowledge and introduce factors extraneous to the logic of science. One assures him that tomorrow, even though government intervention was unthinkable in the past, the scholars and technicians will have to concern themselves more with public affairs and will belong to a world of power, and that the allocation of funds and of time for research will be governed by the kind of knowledge produced. Lastly, one asks the specialist to change his perspective—which is going to require of him considerable effort—because the general statements made by the politicians at the World Population Conference will lead to a complete rethinking of certain conceptions which were overlooked at that meeting. Since that time, there has indeed been much talk among demographers about the sweeping nature of some of the statements made by politicians at the Conference.

One may then try to play the game and examine what, in this author's opinion, should be done to satisfy the wishes expressed by the Conference. After beginning with the problems of observation, the discussion turns to data processing, and, to that end, refers to some specific subjects.

PROBLEMS OF OBSERVATION

Just like related disciplines in the human sciences, demography is a discipline which does not allow the investigator to indulge in experimentation as such: it is subordinate to the directed and controlled observation of facts, with little expectation of laboratory experimentation. The basic scientific act is the slow and careful accumulation of data upon which hypotheses are based before being confirmed by a limited number of laws.

The three basic sources of data collection are censuses, vital statistics and surveys. The first two, labelled "official", are intended to satisfy not only the needs of research, but those of the Government, which take precedence. They were initiated very early in some countries and they explain why demography has always had, even before a methodology was imposed, powerful means of observation. The third source, ever more important, consists of "provoked statistics", usually created from nothing, in order to respond to some specific objects of investigation.

Each of these sources is examined below to see to what extent they are adaptable to the need for enlargement called for by the Conference.

Censuses are usually of a comprehensive character; therefore, one can use the law of large numbers and even go beyond, as significant analysis in no way requires several million observations. But the list of census questions usually leads to variables which are limited in number and rather approximate, indeed trivial, which may not always satisfy the needs of the researcher. They do not lend themselves to the longitudinal analysis intended to follow the incidents related to each person, all the more so because the interval between data-gathering operations is generally 10 years. Censuses constitute, however, an essential tool for research because of the great, even immense, number of observations permitting cross-tabulations in several dimensions. A breakdown of population by characteristics leads to a fractioning of smaller and smaller elements which can still be analysed without jeopardizing the law of random fluctuations. If, for example, one considers the distribution by quinquennial age groups (17 groups), sex (2 possibilities), urban-rural (2 possibilities), active-inactive (2 possibilities), and only 8 geographical zones, one arrives already at a structure containing $17 \times 2 \times 2 \times 2 \times 8 = 1,088$ cells. No other tool produces such a wealth of detail, and yet only interrelationships between elementary variables have been introduced.

Some recommendations made by international forums must be reiterated: it is in no way necessary to use exhaustively all questionnaires; they can and even should be used in a limited way in any analysis dealing with from four to five simultaneous variables, especially because the cost of tabulations increases with the number of questionnaires. As all combinations are not necessary, the analyst must choose and indicate which of them will be essential. It is no doubt possible to draw much more from these censuses than has been done so far; but one cannot hope, however, to go very deeply into the interconnexions as the census questionnaire is limited to avoid any negative effect on the

quality of the answers already inadequate. To mention only one example, the reported level of education is often questionable, even in European countries which have a long history of these operations.

Many similar things could be said for vital records: limited number of variables; doubtful quality of responses; but large number of observations which can only be partially exploited.

It would be unreasonable to expect an adequate improvement in the statistics of vital records in most of the third world for a least a decade and other methods of observations will prove to be urgently needed.

This observation leads to the topic of representative field surveys. These surveys represent a real hope for progress. They are in no way a routine activity and depend almost entirely upon the initiative of the research body and, even more so, upon its possibility for financing. Surveys can gather an abundance of variables (sometimes excessive), in general of a great diversity and quality, depending upon a theoretical plan of research. This is not the case either with censuses or with vital records. In surveys, however, it is the number of observations which is inadequate for making full use of the information. It is impossible to analyse simultaneously the data according to more than two or three dimensions without fragmenting excessively the sample and without taking from it, at the same time, all meaning. Although the so-called "multivariate" methods of analysis, which are extremely useful, sometimes make it possible to circumvent this difficulty, these methods of statistical analysis are never as satisfying as when one works on large samples. One may consider that nearly all of the problems dealt with by demographers and calling for a multidimensional analysis require samples on the order of at least 5,000 questionnaires. This is the case with the World Fertility Survey, which is discussed below. One immediately sees a prerequisite of the success of in-depth research: sufficient resources, which the Government is reluctant to provide because, unlike censuses and vital records, these surveys have no administrative purpose and do not constitute an operation long ago decided upon once and for all.

Here is the paradox: surveys collect more variables than one can analyse, at least simultaneously; but the processing of data gathered through censuses or vital records involves an excessive number of observations relating to very few variables.

A middle ground is proposed with what are called "micro-censuses", which are nothing more than sample surveys carried out on very large samples (on the order of 200,000-300,000 families in the Federal Republic of Germany) with a questionnaire, or rather a form. The information obtained in such micro-censuses is more diverse than that of censuses, although it is limited to factual data and excludes questions of attitude and opinion; but the forms are filled in less carefully than is the case with traditional types of surveys which require greater participation on the part of the investigator. Progress in relation to the censuses is,

however, considerable. Thus, the micro-census of 1966 in the Federal Republic of Germany, for example, permitted the establishment, without recourse to a complex mathematical device and with a small margin of error, of curves of family size according to the husband's earnings (negative relation); and, at the same time, the wife's earnings when she is economically active (U curve), the latter being of the greater interest. Similarly, it has been possible to analyse the economic activity rate of a cohort of married women by duration of marriage and the number of children under 18 living at home, showing how married women enter, leave and return to economic activity according to the events occurring within the family.[4] One is unable to see how it could have been possible to arrive at such results with samples numbering in the thousands. Very large surveys offer possibilities for analyses which surveys based on a few thousand could never provide and it is useless to expect this result from censuses. Success depends essentially upon the nature of the questionnaire, which must be relatively modest compared with the usual psycho-sociological surveys, as it must be presented to many people by a group of investigators, itself very large, and with limited contact between the investigator and the respondent. It is necessary to ensure that sampling errors shall not exceed errors of observation.

The most sophisticated sampling procedure is the "household survey", which is performed on large samples. This type of survey allows for a greater completeness and a better quality of demographic statistics than is possible through censuses or vital records, without, however, pretending to substitute for those two operations a new recording system. It is possible to have available a quantum of information not only of better quality but more diverse, notably because it is possible to subdivide the main sample into subsamples according to particular topics (marital and reproductive history of women, employment and unemployment, migration, etc.).

In developing countries, the procedure sometimes takes the form of repeated surveys among the same households, usually at intervals of from three to six months. Phenomena are best explained if one considers that the events of populations are a series of discontinuous yet interdependent events. In attempting to isolate the time variable, one nears ideal laboratory conditions and arrives at a better position to establish cause and effect relationships. For analyses of sensitive problems, this method of continuing observation proves to be unquestionably superior to surveys involving only one visit, and therefore retrospective, even when they include questions involving the past. According to this method, one could say that the observer tries to deter-

[4] L. Tabah, "Rapport sur les relations entre la fecondité et la condition sociale et économique de la famille en Europe; leurs répercussions sur la politique sociale" (CDE (71) T.III) in Council of Europe, Second European Demographic Conference, Strasbourg, 31 August-7 September 1971. Summary in English.

4

mine events before they happen so as to record and monitor them; and it is of greater use for explaining phenomena than those for which the sole purpose is to reconstitute the past of a group of persons who lived through an event, and which it is difficult, if not impossible, to replace in the situation that prevailed at the time of the phenomena. An analysis of the chain of cause and effect is obviously easier and more satisfying when one isolates the event in the context of the circumstances which produced it, and when one follows its evolution, rather than between events or even beyond the process. A multiround survey not only permits an observation of the changes of status and new events, but enriches the knowledge that one may have of the population, without overloading the questionnaire, by distributing the total number of questions among the different visits, throughout the entire sample or on only a fraction of it.

Geographical mobility

It is certainly difficult to retrace the entire series of movements, or at least to ask questions concerning each link. It would be enough to know some details relating to either period of time (the past five years, for example); or the current residence, the former residence, the amount of time at each and the last occupation in the former residence. These questions would yield good indications permitting a cataloguing of current migratory movements according to the period of residence, the place of origin, activity both past and current, fertility, changes in the composition of the family in relation to its movements etc. If the size of the sample permitted, one could do studies on several dimensions, distinguishing waves of migrants.

This technique presents numerous difficulties which cannot be discussed here due to space limitations, because the sample itself changes by reason of population movements between survey rounds. It should be mentioned, however, that in the formulation of the questionnaire, in order to facilitate the recollection of events, one should try whenever possible to cause the person surveyed to rely on a fixed point which can provide a time reference for other events. One could, for example, relate the history of marriages and births to that of movements from place to place.

Some topics lend themselves to a detailed examination through the techniques of single-round or multiround household surveys:

(a) *Formation of families.* It would be possible to inquire into the history of marriage, births, deaths, using the method of historical demography;

(b) *Education.* It would be possible to gather data that school statistics cannot provide since they are done at the institutional rather than the individual level, such as the current situation of children in school compared with that of the preceding year. It would become possible to obtain information by sex and age on the number entering school, the number promoted and left behind and the number leaving school, in rela-

tion to other variables in the questionnaire (socio-economic level, type of residence, etc.). Even in industrial countries, there is an almost total lack of this information. Specific questions can also be asked about the time interval between departure from school and entrance into the labour force, as well as on first employment (the average time required in order to find a first job, relationships between level of education and the kind of job obtained);

(c) *Occupation and occupational mobility.* One can ask questions similar to census questions (thereby permitting comparisons) about the current occupation; but, at the same time, adding questions about the duration of current occupation and about previous occupation. These two questions permit one to draw relationships between changes in jobs and other changes, such as residence.

Analysis of such types of data is essential for building, on solid bases, projections that include not only demographic but social and economic variables, such as regional projections, educational projections and projections on the availability of work in the various regions. The data can also provide elements that can be used to project the economically active population by sector of activity, which, in turn, is useful in calculating the demand for labour, one of the most sensitive areas of economic forecasting.

Actually, the objectives of such household surveys are not limited to the preceding major areas and one will be able to extract from the sample a number of very interesting by-products, such as:

(a) A study of a subsample of the aged in urban and rural areas and of persons of pre-retirement age (for example, 55-56 years old);

(b) A study of family structure: composition of families, distinguishing the primary nuclear family (parents-children) and the extended family (grandparents, collateral relatives) in different social classes;

(c) The relationship between population and housing;

(d) A special study of large cities;

(e) A subsample of persons born abroad;

(f) A detailed study of youth, as a subsample, for the purpose of analysing their departure from the educational system and their entry (or non-entry) into the work force;

(g) Working women in relation to fertility (history of marriages and births in relation to leaving and returning to the work force).

Such surveys could be repeated every five years in order to facilitate longitudinal analyses.

In fact, many ministries and research institutions in fields related to demography will find in this type of survey the information that they have lacked for socio-economic planning.

The greatest drawback of such sample surveys is obviously their cost, which is, however, less than that of censuses. They also require a body of investigators trained in this type of special operation, not easily found in the international market; and it is not often

that a country has technicians who are capable of mastering the diverse technical difficulties of the different phases of the operation. International co-operation is essential.

One might add some general considerations related to data collection by survey:

(a) It is necessary to caution the investigators against the tendency to accumulate material which will never be used. One does not always follow the principle that everything collected must be with a view towards analysing it. It too often happens that expensive surveys are undertaken and their results not fully exploited. One formulates excellent hypotheses—sometimes even brilliant ones—and draws up astute questions, while being incapable of taking full advantage of all the data collected;

(b) Overwhelmed by the collected data, the investigator abandons it in order to move on to something new rather than devote himself to the painstaking task of analysing the data which he collected. One might ask how many surveys have never been analysed or at best only superficially;

(c) No survey should be developed unless the investigator has in mind the type of analysis which will be performed. Too often, in fact, the survey is initiated without a clear perception of what is required to be drawn from the data;

(d) One should avoid permitting too long a time to lapse between the collection and dissemination of findings because most often the data are "perishable" with a life of only a few years;

(e) A study of different types of errors often is neglected;

(f) There will always be interest in comparing the survey findings with those obtained from an independent source. For a comparison of the findings with vital statistics, for example, one could turn to Chandra Sekaran and Deming's [5] method for comparison.

Historical demography

This subject should not be closed without a few lines on historical demography, a field not in vogue for several years, because demography, like all disciplines, also has its fashions. Many investigators—indeed, some of the best—indulge in it: some because they want to stay clear of publicly debated issues and feel more comfortable in a field where the separateness of the investigator and the subject of his investigation is maintained; others because they find it an easier route to achieving a reputation in a scientific field than by addressing themselves to current world problems. The legitimate interest generated is considerable, especially in the wake of the imaginative work done by Louis Henry.

Certainly, many things from the past do not deserve to die and one cannot deny it is useful to know the past to understand the present. The work of the "historical" demographer falls between that of the historian, who studies a unique, non-recurring event at a point in time, and that of the sociologist, who attempts to establish relationships between recurrent events with a view towards action. In moving backwards to the study of former populations, he is motivated by a desire to grasp the past with a view towards understanding the present, to highlight categories and regulations, even if the present and the future lead to a drastically new future, even if one knows that events do not repeat themselves as seasons and that the theory of demographic transition is not a valid pattern for all and for ever, and that it is singularly unwise to extrapolate indefinitely.

This process is attractive to the extent that the investigator tries to understand demographic evolutions and to place them in their social and institutional context, because birth and death rates are not isolated events since the investigator asks in the past tense questions relating to the present and the future.

The study of demographic history should be encouraged; it has not yet revealed all that can be expected. In particular, it must not be restricted to the study of fertility and mortality. Problems of migratory movements and of the processes of urbanization in different countries and at different periods of time also must be considered.

However, one cannot but think that the 1970s merit more attention than the 1770s, that travel in space is more promising than travel in time, because the traveller can plan his own journey. That is, observation can be planned today with a view towards responding to precise research objectives; but things from the past are just that, namely, dead and buried. It is certainly good for the apprentice demographer to reflect on eighteenth-century European demography, but more importantly on the major problems of today.

Thus far, the lessons of history have always been needed to provide one with bearings in political and social activity. Everything indicates that at the current time, the historical experience will not prove adequate because evolution is becoming so rapid, one change follows another so quickly that past experience can no longer help as it once did.

SOME MAJOR PROBLEMS

It is not enough to collect data and figures. The main work of the demographer, like that of all other social scientists, is to explain the data, to organize them, to classify similar and different occurrences and to identify the trends because events do not follow each other according to an apparently whimsical pattern. He must, above all, endeavour to explain a demographic phenomenon by a social fact and to explain population events within their social and institutional contexts. Consider the following aspects.

[5] C. Chandra Sekar (now Chandrasekaran) and W. Edwards Deming, "On a method for estimating birth and death rates and the extent of registration", *Journal of the American Statistical Association*, vol. LXIV, No. 245 (1949), pp. 101-15.

Setting up a demographic observatory

One of the first tasks will be to follow, step by step, the continuously unfolding demographic situation, especially at this time when one can expect rapid changes. The demographer's role must then, first, consist in observing population data in a broad context, that is to say, without being limited to fertility but including each of the variables as set forth in the World Population Plan of Action. As the changes from one year to another are minimal and hardly perceptible, subject to variations that may come from the quality of information, it is difficult to evaluate these variations on a year-to-year basis only.

There exists at the United Nations a mechanism involving Headquarters as well as the regional commissions and the specialized agencies, the purpose of which is to serve as a sort of "demographic observatory", or "control tower", which scans objectively but attentively the surface of events, in order to analyse them and to disseminate among the public an analysis couched in terms that are as sober and clear as possible and devoid of technical language.

Agreements should be reached with national bureaux of statistics to quickly provide their sets of indispensable data.

Reproduction

If there is one area in which progress has influenced the fate of populations, it is the biomedical sciences, owing to improvements in contraceptives and in the methods of abortion—truly a technological revolution.[6] A wide range of means is already available and although innovations in this field are to be expected and must be promoted, it is probable that the future lies in a panoply of means rather than in one panacea.

The demographic effects are still at their inception, but are already considerable, even if one is incapable of measuring with the desired accuracy and even if some observers show a certain impatience and want to accelerate the course of events. In a few years, populations who were unprepared to resort to even the simplest contraceptive methods used by Europeans over the centuries have adopted these new means. Although the imperfection of birth control devices clearly cannot explain the high fertility level in third world countries, one cannot deny that technology, progress and knowledge can accelerate an otherwise inevitable evolution.

The implications are equally notable in industrialized countries, even if these countries have been practising birth control effectively for centuries, but with means which today seem archaic and uncomfortable. Certainly, history shows that a society which wants to limit births always finds the means to do so; but it will be easier and more certain and afford less frustration and constraint if it has available more advanced technology and appropriate services.

The interest is not solely demographic. It touches also on the health and stability of the person and of the couple for whom this approach is a source of unity indispensable to its full development. These techniques permit a more conscious and responsible parenthood, this being a major principle of the World Population Plan of Action; the underlying rationale is that procreation is not the sole objective of conjugal acts and that fertility should not be left to chance. It has been shown, notably by the World Health Organization, that the benefits of regulated fertility extend to all members of the family, and particularly to the children.[7]

For some 20 years, fertility has been the subject of a large number of studies, involving not only demography, but biology, sociology, economics, psychology and even genetics.[8] This is an example of a multidisciplinary approach to which bare "lip service" has often been paid and which seldom has been applied. The extent to which progress has been made along socio-economic and cultural lines, free from interference, is particularly due to the longitudinal analyses which followed P. K. Whelpton's work. All of this work has contributed to progress, not only in the field of demography but in other fields, such as survey methodology. Such work has also contributed to a better knowledge of the third world and especially as a result of the very specific Knowledge-Attitude Practice (KAP) surveys (poorly named because they go far beyond contraception). Without breaking really new ground, this research often has contributed to a better understanding of daily life in poor countries.

These surveys are so numerous and of such value that one cannot claim to have considered all of them. This type of exercise will become more and more difficult as time passes. Recently, an effort at systematization was begun with the World Fertility Survey,[9] a vast undertaking of comparative surveys based on large samples (on the order of 5,000-10,000 women), and containing exceedingly precise questions which will considerably increase the knowledge of a variety of demographic and cultural conditions in these populations.

Suggested areas for study

Good progress is being made in the area of fertility studies. Some suggestions for continuing efforts are given below.

Need for synthesis of data

There is greater need than ever to rationalize the data and to provide a synthesis of it because the avail-

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[6] World Health Organization, "Research on the biomedical aspects of fertility regulation and the operational aspects of family planning programmes", in *Population Debate*, vol. II (United Nations publication, Sales No. E/F/S.75.XIII.5), part eight, pp. 560-72.

[7] World Health Organization, "Health and family planning", in *Population Debate*, vol. II, part eight, pp. 461-79.

[8] Charles F. Westoff, "Population and the family: overview", in *Population Debate*, vol. II, part six, pp. 313-19.

[9] International Statistics Institute, *The World Fertility Survey: The First Three Years, January 1972–January 1975* (The Hague, 1975).

able material is considerable and has not yielded all the expected benefits. A balance must be found between the resources for collecting data and the insufficient resources allocated for analysing them.

This attempt would be facilitated by a "thesaurus" and a computerization of available documentation (Population Information System).

A mechanism for the analyses of the results of the World Fertility Survey must be set up right away if this material is not to suffer the fate of other research, wasted or under-utilized, or left standing for so long as to have lost all possible value. The material is so extensive that it lends itself not only to a global comparative analysis, but to a number of studies on specific subjects, similar to those which have already been undertaken since the first such survey in Indianapolis (United States of America) in the 1940s, which showed the proper course to follow in many respects.

Need for study of social and cultural background

A study of the demographic, sociological and cultural environment of populations who are the object of a fertility survey should also be undertaken. Without this complementary research, all conclusions and comparisons would be deceptive. To reap the full significance of the collected information and to facilitate data processing, the fertility analysis has to be integrated with an analysis of the social and cultural structure, the facts observed must be placed in the proper context, and the variables of the questionnaires must not be considered the only basis for study. Attention must focus not only on demographic events as such, but on the conditions that made them possible.

Efforts should be made to clarify the independent variables in fertility surveys. Very often, these variables are mentioned quite abstractly under such headings as "industrialization", "urbanization", "modern sector" or "traditional sector". Such abstract terminology in no way suggests the complex of social, cultural and economic changes which a population undergoes throughout the course of its existence. Similarly, with respect to education, the question which presents itself is to know what education is about: traditionally, primary education, secondary education etc.; or less formal education, less "European-oriented", providing a broader view, a greater degree of participation in community life, particularly as regards women. Education is a lever for behavioural changes in respect both of responsible parenthood and of global development. But it is no longer evident that it must rely on European standards to achieve this objective. It is necessary to try not to rely on formulae of little significance. Surveys intended to explore certain themes extensively, such as the relationship between fertility and education, or between fertility and the progress of modernization, or customary traditional norms, must be considered. It can be particularly interesting to determine the extent to which traditional obstacles, especially in a rural environment, can be eliminated; or, on the contrary, are impervious to change. Similarly, studies must

be made of the so-called "collective consciousness", the motivation that compels people while they think they act freely—that is to say, those things which one must acquire in order to modify behaviour—in the context of fertility. Attitudes and motivation, in fact, can only explain patterns of behaviour within the framework of a determined social environment, or of a generally accepted way of thinking. To take but one example, in China, it is the "consciousness of the masses" and not the force of law or of the police which makes every man remain chaste until 28, every woman until 25—at least in the towns—and which did away with adultery, prostitution and even with the motorists' desire to go through red lights. This collective moral pressure upon the individual is totally lacking in other populations, goes in the opposite direction or is less felt. Here, then, is a good topic for studies.

It appears that the short-coming of fertility surveys has been an insufficient attention to cultural factors, which, as Coale [10] has shown, have, none the less, played an important role in the European demographic resolution. This factor explains, among others, the failure of attempts to implement birth control programmes not adapted to social, economic and cultural structures. To be complete, fertility research should be supplemented by studies on all of the intimately related elements which are subtly linked and often difficult to perceive, and which make up the culture of a society. Closer contacts with specialists in cultural anthropology would be desirable.

Need to ensure validity of responses

Efforts should be made to measure the validity of responses to survey questions. To what extent is the respondent honestly answering them? Preliminary studies also must be made on the thought put into responses, particularly when questions concern attitudes, and on the consistency of responses.

Need for repeated "light" surveys

In addition to "heavy" fertility studies (a battery of many questions given to thousands of people), a continued programme of "light" surveys, repeated frequently, containing a small number of questions related to attitudes and opinion, especially on the size of the ideal family, and where results would be readily available, must be considered.

The Symposium on Population and the Family, held at Honolulu, from 6 to 15 August 1973, recommended a micro-analysis scale for the study of problems of the family and fertility.[11] This procedure appears all the more desirable because families often perceive their economic and social problems, those concerning reproduction or education, as being rather different from those of society at large. They are seldom aware of the interdependence between their individual interests and

[10] Ansley J. Coale, "The demographic transition", *Population Debate*, vol. I, part two, pp. 346-56.

[11] "Report of the Symposium on Population and the Family", *Population Debate*, vol. II, annex III, pp. 700-12.

those of the community. It would be particularly interesting to study the decision-making process in the family as it develops.

Research should take into consideration the variety of local conditions. There exist, in fact, some purely local situations which must be analysed as such, and the sum of which does not necessarily equal the situation of the country.

Need for extensive research on family evaluation

With the "clinical" type of survey concerning a limited number of cases (about 100) which is directed towards a detailed analysis of patterns of behaviour and involves "directed" questionnaires applied by psychologists, it should be possible to orient further research or to interpret the results of previous surveys.

Research on the interdependent nature of the structure of parenthood and the movement through the life cycle would be desirable. Relating the two typologies, demographic parameters and family structures, is of the greatest interest for assessing the upheavals that affect family formation and family structures as the demographic transition advances.[12] This research could be done using simulation models.

Simulation models are equally appropriate for the study of reproduction in a natural or Malthusian situation[13] In these models (which take into account fecundability, effectiveness of contraception; and abortion according to age, parity etc.), a hypothetical group of women is exposed to certain possibilities, or "risks", during their fecund life: marriage; conceptions; births; intra-uterine infant deaths; sterility; widowhood; divorce; remarriage; death. Calculations then permit a reconstruction of the theoretical total population to determine, according to the chosen hypotheses, its demographic characteristics. A specific interest is attached to population trends according to anti-natalist practices. Some questions put to the computer would be to determine, based on these complex variables, what effects contraception used by different families would have on the rate of fertility and population growth or those of different models of marriage on fertility. This tool is very flexible and of great interest for choosing a population policy. Unfortunately, little use of it has been made in the conditions prevailing in the third world.

Research on family planning

One of the most difficult tasks facing demographers in the next few years will be to develop methods for determining the part that family planning plays in the birth-rate trends of a country. The possible methods are necessarily indirect and only partially suited to the objective. The problem is all the more urgent because family planning activities will no doubt expand considerably in the next few years in the third world, and Governments called upon to make a substantial investment will necessarily turn to the specialist to balance costs and benefits, as with any other investment.

Research on the subject of family planning is an integral part of demographic research because the plans for family planning must be adapted to cultural norms and socio-economic structures if they are to be effective. The methods for assessing their efficiency come from traditional demography (attrition tables of a cohort subject to increments and decrements elaborated by R. G. Potter and C. Tietze).[14] This research also relates to births averted at the national level, or to the extent to which contraception is systematically applied, to the rate of continuity of contraception, to the characteristics of users, to the dissemination of information, to the administrative structure[15] and to the advantages and costs of a family planning programme. This computation is more difficult to arrive at than that for a single, simple project like the construction of a factory. The guiding principle in this field has to be that the objective (reduction in the rate of increase, assurance of responsible parenthood) must be attained at the least cost.

The problems and documentation related to family planning are so great that here, too, it is useful to develop a programme for computerizing the information.

The political problems arising out of family planning in the third world must also be considered. Too often, these programmes are perceived as being imposed by and for the benefit of the outside. Even the *élite* believe this to be true. This is an objective truth, a social fact meriting attention, and a survey among the *élite* can provide significant, useful information.

Mortality and morbidity

One of the oldest concerns of demographers has been that of mortality and not fertility. The first table of the survivorship function, developed by Edmond Halley, the renowned astronomer and discoverer of the comet named after him, was devised for the town of Breslau for the period 1687-1691, upon data furnished by his friend Leibnitz. In addition to being one of the first applications of the scientific method to the population problem, it is also one of the first devoted to human phenomena. What appears to have inspired

[12] Norman B. Ryder, "Reproductive behaviour and the family life cycle", *Population Debate,* vol. II, part six, pp. 278-88.

[13] See, for example, M. C. Sheps and E. B. Perrin, "The distribution of birth intervals under a class of stochastic models", *Population Studies,* vol. XVII, No. 3 (1964), pp. 321-31; J. C. Ridley and M. C. Sheps, "An analytic simulation model of human reproduction with demographic and biological data components", *Population Studies,* vol. XIX, No. 3 (1966), pp. 297-310; I. Holmberg, *Fecundity, Fertility and Family Planning: Application of Demographic Micromodels,* vol. I, Demographic Institute report No. 10; vol. II, No. 11 (Gothenburg, Sweden, University of Gothenburg, 1968); A. Jacquard, "La reproduction humaine en régime malthusien", *Population,* vol. 22 (1957), pp. 897-920.

[14] See, for example, R. G. Potter, "The multiple decrement life table as an approach to the measurement of use effectiveness and demographic effectiveness of contraception", in International Union for the Scientific Study of Population, *Contributed Papers, Sydney Conference,* 21-25 August 1967 (Liège, 1967), pp. 869-83; and C. Tietze and R. G. Potter, "Statistical evaluation of the rhythm method", *American Journal of Obstetrics and Gynecology,* vol. 84, No. 5 (1962), pp. 692-98.

[15] J. R. Ross and others, *Findings from Family Planning Research,* Reports on Population/Family Planning, No. 12 (New York, The Population Council, 1972).

Halley and Leibnitz was the search for "invariants", as in astronomy and physics.

Over the course of the past few decades, fertility rather than mortality has attracted the primary interest of demographers: first, because in the third world it is the behaviour of the fertility curve which controls global demographic evolution; secondly, because demographers feel that fertility can be more directly influenced by their intervention than mortality, the reduction of which depends upon medical science and upon general progress. Their role in mortality is limited to the measurement of the phenomenon, whereas in fertility they often go beyond a simple description of reality and actively participate in the social realm, through the "active research" that involves the researcher.

However, the desire to limit an excessive population growth in certain countries must not close the door to a different fight against nature. What is striking here is that the picture has become less promising than it was 10 years ago. Developed countries have witnessed a deceleration of progress; and even for the older age groups, a deterioration of the situation, which, however slight, is nevertheless symptomatic. In the third world, progress also is slower than anticipated. Considerable differences exist between countries, and within countries, differentials more striking than in any other demographic variable, constituting one of the most obvious manifestations of social injustice. No doubt, the task must bear as much on the protection of life, and particularly on the lives of those who are the most vulnerable, as on the potentials for life—that is, birth—and their necessary regulation. Mortality certainly has aspects of concern to politicians.

In fact, the study of mortality can become much more attractive if no longer limited to the mathematical relation of the survivorship function, sometimes to the fifth decimal, according to sex and age, but extended to the social and environmental conditions of the phenomenon.

Fields of inquiry are not lacking, but they depend upon the quality of available information. Among such fields are:

(a) Social mortality differences according to causes of death, such as that undertaken in England since W. Farr (1851), in the United States of America, and, more recently, in France, stressing infant and peri-natal mortality;

(b) Study of the interdependence between different causes of death;

(c) Effect of the disappearance of certain endemic diseases on mortality in the third world;

(d) Interrelationship between mortality and morbidity, still little known because of the difficulties in collecting data (household surveys prove to be of little value);

(e) Interrelationship between infant mortality and fertility. It has often been said that the drop in mortality preceded the drop in fertility. The observation is not questionable but the workings of the phenomena are still not known; [16]

(f) Influence of nutrition on mortality;

(g) Specific study of increasingly frequent causes of death, such as death from accidents;

(h) Specific study of mortality and morbidity in certain professions.

International migrations

The problems of international migrations are of great complexity and, doubtless, it is not enough to summarize their nature by simply saying that international movements of populations are a reflection of complementary imperfections and that they benefit the country of origin as much as the country of destination. Those who leave their country often do so because they cannot be integrated into the political and socio-economic environments; and these movements can constitute a safety-valve which permits the release of demographic pressures, although they rarely constitute a real way to eliminate these pressures. In the receiving countries, migration can be a partial remedy for a shortage of unskilled labour; or, on the contrary, can bring in labour too qualified to become absorbed by the economy of developing countries, thus attracting unskilled labour as well as "brains". A few countries lure migrants to colonize inadequately used land.

Be that as it may, international migrations are no longer as important a factor as in the past in the redistribution of populations across countries and continents. Furthermore, the currents of migration have changed direction. North America and Oceania continue to take in immigrants, but there has been a reversal in the trends of migratory movements between major regions. Europe, which lost 5.4 million inhabitants from 1946 to 1957 as a result of migrations has, due to an influx of immigrants from Africa and some other areas, almost returned to a state of equilibrium. Latin America, which has long been an area to which people immigrated and which had an increase of a million people between 1946 and 1957, is becoming an area from which people are emigrating. Africa and Latin America, with relatively light population density but with high growth rates, are becoming regions from which people are emigrating; while Europe, with heavy population density and low growth rates, is becoming a receiving land.

A seminar[17] was recently held on the subject of demographic research on international migrations. Some suggestions made by the seminar are as follows:

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[16] *Report of the Seminar on Infant Mortality in Relation to the Level of Fertility,* Bangkok, 6-12 May 1975; sponsored jointly by the Committee for International Co-ordination of National Research in Demography (CICRED), the United Nations and the United Nations Fund for Population Activities (Paris, CICRED, 1975).

[17] Comité international de coordination des recherches nationales en démographie, "Recherche démographique en liaison avec les migrations internationales", *Population Debate,* vol. I, part two, pp. 249-58; report of the seminar on this subject organized by CICRED at Buenos Aires, 5-11 May 1974.

(a) Measure migratory flows through the use of censuses, samples, and records of entry and departure, whenever possible;

(b) Study migratory "histories" by cohorts, which implies knowledge about the length of stay of migrants;

(c) Conduct research on the decision to migrate;

(d) Study the structure (political, economic, demographic etc.) of the country of departure and its influence on migratory movements;

(e) Improve knowledge of the economic aspects of migration;

(f) Establish a direct relationship between international migration and other demographic variables (effects on nuptiality, fertility of migrants etc.);

(g) Establish a relationship between international migration and economic and social changes;

(h) Study problems of the assimilation and integration of migrants and the "tolerance" of receiving countries;

(i) Study the motivation for return migration;

(j) Examine legislation in the area of international migrations;

(k) Determine the effect of the "brain drain";

(l) Study the problems related to the protection of migrants and their families (housing, freedom of association, acquisition of citizenships in the host country etc.)

Internal migrations and rural development

Many of the social and economic problems that a developing country must confront are aggravated by accelerated urbanization. Migrants to cities, pressured by actual population growth and agricultural stagnation, or simply attracted by an urban life-style, are confronted by limited employment opportunities in the cities and by the inadequacy of the urban infrastructure, which cannot keep pace with their rate of growth. Surely, in the third world, the "green revolution" has facilitated, in some regions, a certain degree of retention of rural populations, although it involves increased automation, sometimes leads to the elimination of small holdings and tends to enlarge the gap between rich and poor. This is the classical situation where progress involves both creation and destruction, a process which will have to be mastered to a greater degree. Turning back the clock, however, is unthinkable.

Research in the third world must, above all, tend towards a combined strategy of urban and rural development concerning industrial location policies, rural housing and a reduction of the gap between urban and rural incomes in order to limit migration to cities. It is likewise necessary to study the pattern of rural settlements, in the framework of a wider agricultural policy directed towards increasing agricultural productivity.

Much of the previously suggested research directed towards international migration also applies here: calculations of flows according to the characteristics of migrants; studies on the decision to migrate; and so forth.

Population and development

In the absence of a general direction for research, the interrelationships between demographic evolution and development have been extensively talked about but clear conclusions have not yet emerged.

The field is ill-defined and it is easy to get lost in it. Moreover, as the subject enlarges, it escapes the profession and one knows that social science researchers often behave like members of the same species which by eating each other ensure the survival of their kind.

In the absence of Ariadne's thread, one is reduced to a trial-and-error method, on both the theoretical and the practical level. If there is one field where research must be organized, this is it. This point is reaffirmed in the conclusions. Some possible approaches, along the lines of the Conference at Bucharest, are described below.

Projections

Nearly all the work of demographers is intended to provide the basis for sound projections. In other words, they are almost totally necessary for the future. The method of projections dates back to the dissertation Euler made in 1760 to the Royal Academy of Arts and Sciences, and has not much progressed whatever the mathematical presentation or the number of variables introduced. It is little more than an extrapolation of independent variables, mainly because the knowledge of the present and relationships between variables is very imperfect. All futurologists should ponder on this sentence from Marcel Proust: "We represent the future as a reflection of the present projected into an empty future; whereas it is often the very immediate result of causes most of which escape us". Recent debates [18] show that even for Europe, which is better equipped with statistics than other areas, specialists are incapable of predicting demographic fluctuations for as short a period as five years, and perhaps not even that. In fact, it is the failure to recognize the interconnexions between variables in the past or present which impedes the ability to make satisfactory projections, and the need to accumulate the so-called "feedbacks" is stressed below.

Whatever their short-comings, one cannot deny that in an era where planning is widespread, there is a great interest in being able to make projections and to have at least contingent calculations. Indeed, international forums were at the origin of the first projections when in 1925 the League of Nations concerned itself with determining the number of men who were capable of bearing arms. Subsequently, the calculations became more complex: calculation by sex and age; diverse derived projections bearing on the entry into and departure from the work force; and on urban and rural pop-

[18] "Record of the United Nations/United Nations Fund for Population Activities Post-World Population Conference Consultation among Countries of the ECE Region", Geneva, 7-11 July 1975 (ESA/P/AC.5/5 and Corr. 1).

ulation, agrarian and non-agrarian population and urban agglomeration; educational projections, projections on housing (and on population living in new housing projects), and sometimes on the sophisticated relations between the different networks of projections. Recently, projections of households have been added; such projections are of great use in economics, notably to forecast consumption.

It soon proved indispensable for the United Nations system (the Population Division of the Department of Economic and Social Affairs and the specialized agencies) to make mutually co-ordinated calculations, i.e., calculations based on the same hypotheses, to arrive at consistent global results.

All of these calculations are of interest from two points of view:

(*a*) For short-, medium- and even long-term planning, although unfortunately they have so far been little used by planners;

(*b*) To serve as a basis for population policies. The aim of these calculations can be, through a comparison of two perspectives which differ by only one variable, to determine the effect of that variable. What one is looking for is not so much a means of predicting the future population and its structure as a way to evaluate the "weight" of a single variable in a situation perfectly predetermined by the way it is set up. The calculation is a type of simulation used to point up a variety of futures, allowing for a margin of uncertainty in which decision-makers are able to make choices. It can also serve to inform, or rather alert, public opinion and Governments of the possible course of events in the absence of a determined social or demographic policy. One can cite numerous examples of this type during the past decade.

Given the uncertainty of the future, projections should be reviewed periodically, say, every five years.

Studies of interrelationships between variables

One condition of progress in the area of projection, which remains a priority, is the work being done to identify relationships between population data and socio-demographic variables by assigning them observable numerical values in order to reduce the independence of demographic parameters used in projections. It is precisely there that a research organization is needed, as the relationships between variables are so numerous. Mention has often been made of the need for a data bank on matters concerning population. It appears desirable to go further and to store information concerning the quantified relationships between the variables, for example, on the relationship between economic activity of women and fertility, between economic activity of women and migration, household income, education etc. Relationships may involve two, three parameters, even more.

Certainly, it is possible that researchers will use these feedbacks indiscriminately, applying to one population relationships found in others where the characteristics are entirely different. Properly used, however,

this data bank would be of great value in helping to establish those limited laws mentioned earlier.[19] Taping these feedbacks would be essential as soon as the amount of information is sufficient and, in fact, literature is already so full of this type of information that the idea of a thesaurus is already practicable.

As was stated at the United Nations Symposium on Population and Development, held at Cairo from 4 to 14 June 1973, the knowledge of socio-economic and cultural factors influencing demographic change is better than the knowledge of the inverse, that is, of the effect of demographic change on socio-economic factors.[20] This appears surprising because the first type of research is relatively more expensive, relying on survey methods, than the second, information about which can be computed in a research bureau and is therefore cheap. And, nevertheless, both are of great interest for the politician and the decision-maker. It would be advisable to correct this imbalance. Certain aspects of this huge field, in particular, questions of food, hygiene and employment, are, to a large extent, taken up by the specialized agencies of the United Nations.

Specific study of typical populations

What should be done, taking account of a typology of countries according to their demographic and economic situation (which remains to be determined) is to choose some typical populations for which reliable statistics are available, and where fertility is on the decline, in order to evaluate concretely the weight of the demographic variable in the past, present and future. What would have happened if demographic evolution had been different? What will happen in the future if policies are not adapted to specific demographic trends from the point of view of investments for community facilities, food, environment, consumption of new materials, foreign trade etc.? Take an example: many third world countries traditionally had been exporters of food products and have now become importers of these same products. What part has population growth played in this reversal?

In those population types for which fertility has declined in recent years, it would be useful to highlight the origin of socio-economic and cultural factors which can account for the change in the behaviour of couples.

*Integration of the population factor
in economic planning*

The need to integrate the demographic variables in economic planning is often mentioned, and a specific recommendation to this end was adopted at The World Population Conference at Bucharest. One must begin by recognizing that a methodology is totally lacking and the first task must consist in filling this gap. Demogra-

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[19] See, in particular, the work done by the International Labour Office within the framework of the World Employment Programme.

[20] "Report of the Symposium on Population and Development", *Population Debate*, vol. II, annex I, pp. 677-86.

phers find themselves, in effect, in a situation similar to that in which economists found themselves 20 years ago when their research lacked a method for economic planning. This is common today.

The integration of the demographic factor in planning is not an easily accomplished task because planning is not merely putting together a group of projections. The establishment of a closer interdependence between human and physical factors does not consist in juxtaposing or even combining separate projections.

A really integrated system is essential for facilitating decision making at the different levels where the strategic directives are applied to quantify the terms of technical choices both in the economic sector and in regard to population.

Effects of social structure and its changes

Thus far, little attention has been paid to the study of the effects of social structures, and their changes, on demographic behaviour; and, inversely, to the study of the effects of changes in demographic behaviour on social structure, particularly in developing countries. It is said that the first stage of economic take-off in the third world results in a deepening of the income gap. To what extent has this phenomenon retarded the demographic transition? Conversely, to what extent have successful family planning campaigns in the traditional sector accelerated the demographic transition? True economic development, like demographic transition, necessarily implies a change in the traditional sector, which is the most important and the most basic. Many questions exist which require answers.

Research on the economic theory of family formation

The interest of researchers in concretely quantifying the economic effects of fertility changes at the macro-level is indicated above. It is equally interesting to study, at the micro-level, the advantages benefiting families and to examine the range of interactions between the macro- and micro-levels.

The analysis is similar to the traditional cost-benefit analysis of an investment project, which is intended to compare inputs with benefits in a time framework.[21] The problem with this research is that it regards children as goods, whereas non-economic aspects, such as the effective value of children, interfere and are by definition non-quantifiable. There are no market laws which apply to births. Couples take into account emotional considerations that have little in common with the benefits or drawbacks that may affect society. One's gain can be the other's loss. Moreover, generation gaps can appear: what one generation wants may not suit the following, which sees itself as inescapably the heir to a situation with burdensome consequences. For example, the current growth in population in industrialized countries is due to the "baby boom" in the years following the Second World War.

Technical problems also arise, specifically those deriving from the realization of costs and benefits which have not yet been overcome. Research must, however, be continued.

Demographic and social fluctuations in industrialized countries

For the past 40 years, it has appeared that fluctuations in the birth rate in industrialized countries were linked to changes in the social climate. During the great depression of the 1930s, the net reproduction rate fell to about 0.8 in Sweden, France and the United States of America. In the United States, the rate climbed to 1.71 in 1959-1961; but in the past few years, it again dropped to less than 1. One may ask whether these changes, more or less parallel, are controlled by common factors, such as the great depression, the years of reconstruction following the Second World War; and the crisis of the affluent society, which, since 1964 especially in Europe, but also in the Union of Soviet Socialist Republics and in the United States, has apparently resulted in a drop in fertility. The current decline of fertility appears, however, to have preceded the perception of the current crisis. One can assume that demographic behaviour is becoming increasingly sensitive to changes in the social climate as couples acquire greater control in their procreation, and they are increasingly guided by economic and social conditions in the decision to have children. One cannot doubt that the immigration policies of receiving countries are also linked to the whims of the economic situation.

Large economic and social fluctuations, accompanied by changes in behaviour of the population, are thus reflected in changes of demographic structures, particularly by age, whose feedback must be studied at the economic level: public investments; employment; social security; housing; etc.

One must also ask oneself what the long-term effects can be of sudden changes in birth rates, such as the industrialized countries have experienced during the past 10 years.

Population and environment

The problems relating to population and environment are relatively new for the demographer and concentrate on two aspects—health and spatial policy.

[21] This technique was developed by Enke, Zaidan, Demeny, Liebenstein and Easterlin, after the pioneering work of A. Lotka, C. Mortara and A. Sauvy. See, for example, S. Enke, "Speculations on population growth and economic development", *Quarterly Journal of Economics*, vol. 71, No. 1 (1957), pp. 19-35; G. Zaidan, *The Cost and Benefits of Family Planning Programmes*, World Bank Staff Occasional Papers, No. 12 (Washington, D.C., 1972); P. Demeny, "The economics of government payments to limit population: a comment", *Economic Development and Cultural Change*, vol. 9, No. 2 (1961), pp. 641-44; H. Liebenstein, *Economic Backwardness and Economic Growth* (New York, John Wiley and Sons, 1957); and R. Easterlin, "Effects of economic growth on the economic development of developing countries", *Annals of the American Academy of Political and Social Science*, No. 369 (January 1967), pp. 98-108. For an excellent synthesis, see W. C. Robinson and D. E. Horlacher, *Population Growth and Economic Welfare*, Reports on Population/Family Planning, No. 6 (New York, The Population Council, 1971).

A World Health Organization symposium was held in Paris in June 1974 to consider the first aspect. According to its report, hundreds of millions of people lose their lives or their health because of diseases existing in the environment in which they live. Inadequate use of an ill-assimilated technology, soil deterioration, water pollution and urban congestion coincide with an unprecedented improvement of living and health conditions at an increasing cost. What is gained on one side is lost on the other. Trade-offs are inevitable.

Any study in this field is difficult because statistical data are inadequate and any comparison with the past is, therefore, almost impossible. Moreover, a long period sometimes separates the onset of a disease from the time it actually becomes observable. Sometimes, also, one includes noxious effects that are not new, such as those of tobacco, whereas the real problem is the aggravation of certain phenomena, such as the increased air pollution which in certain cities accounts for the serious and continuing deterioration of the respiratory system.

A need exists to begin to establish criteria for measuring the ways in which man is changing the environment and then to establish cause and effect relationships.[22]

Another concern for demographers is to examine the objective, measurable changes in the physical environment which result from population growth and its poor geographical distribution. To what degree does a relationship exist between demographic evolution and the increase of nuisances? What will be the relative effect of industrial and population growth on the environment of the region? Two aspects, namely, industrial location and population distribution, must be considered because some intrinsically pollutant industrial activities become tolerable if they are adequately located. Non-economic considerations regarding physical planning may lead to the conclusion that the optimal geographical distribution of population and purely economic considerations may not run parallel.[23] This is a sensitive area in which demographers can make a useful contribution.

Population policies

Population policies are a relatively new field of study, but one in which considerable interest has recently been aroused in response to a growing need for intervention in demographic processes. A wish to see demographic trends and structures conform more to the needs of and plans for society is becoming an integral part of a general aspiration for an even more complete mastery over the human factors of development. Nevertheless, this field of study, more than any other, encounters obstacles because it often touches on national susceptibilities, sometimes impinges upon prevailing ideologies, and, moreover, seeks to affect the more private aspects of people's lives.

An attempt can be made to identify the principal research steps required to study population policies from the time of their inception to their eventual disappearance, i.e., most often to their success or failure. A first step would be to consider government perception of relationships that exist between demographic and non-demographic processes.[24] How and when does this perception appear? What statistical relationship exists between what is perceived and what actually exists? How is this perception modified and why? A second step would be to identify problems resulting from an imbalance of demographic and non-demographic processes. What methods for analysis are used to this end? What value systems are considered? How does the identification of demographic problems influence, or how is it influenced by, the total problem of development? A third step would be to formulate and implement population policies directed towards solving these problems. Who are the actors—individuals or institutions—who participate in this formulation? Since any policy implies a choice, which are the criteria used to allocate the resources needed to implement those policies? The implementation of these policies faces various obstacles linked to red tape, and to cultural and social resistance, which themselves deserve attention. A fourth step would be to analyse the methods for evaluating population policies. How are population policies evaluated, what criteria are used, what hypotheses are proposed concerning the existence or non-existence of relationships between demographic and non-demographic processes?

By merely listing these few points, it appears that population policies, i.e., action-oriented demography, are heavily dependent upon other social sciences and, specifically, upon those which help to clarify the relation between population and development. The amount of work to be done in developing the hypotheses, concepts and methods is enormous and the difficulties considerable. However, an analysis of the existing data, using already available means, would contribute to clarifying the processes related to the formulation of population policies and would no doubt contribute to the establishment of a national plan for ordering the research priorities.

FINAL COMMENTS: NEED FOR WORLD-WIDE
SCIENTIFIC THOUGHT

Demography is a changing discipline because of the general evolution of human sciences, but also as a result of a renewed world-wide interest in the questions of population, arising out of the major problems which confront the world; and, lastly, as a result of the continued permeation of political factors into all areas of knowledge. Its scope has enlarged considerably; the

[22] "Report of the Symposium on Population, Resources and Environment", *Population Debate*, vol. II, annex II, pp. 687-99.
[23] Jean Labasse, *Development and Pollution*, lecture series on population (Liege, International Union for the Scientific Study of Population, 1974).

[24] United Nations Secretariat, "Population policies and programmes", *Population Debate*, vol. II, part nine, pp. 583-605.

need for new research is greater than ever. The World Population Conference has merely accelerated a latent evolution.

In future, attempts to explain population phenomena must go beyond the discipline itself, as the explanation is of a sociological, economic, biological and even political nature, and not purely demographic. The demographer can neither analyse nor predict the evolution of population without a knowledge of society. He must integrate data on population with social data. Otherwise, his work will be of no bearing or consequence.

One of the results of this evolution is that the demographer will have to have greater knowledge of the relationships existing between the disciplines and, to this end, substitute for a high degree of specialization a collaboration with researchers in other fields of knowledge. He must doubtless also acquire a direct knowledge of the societies and environment that he is studying. He must also, without the risk of losing precision, scientific integrity and dignity, force himself to become active by participating in the direction and preparation of concrete operations. Lastly, he must attempt to explain the results of his work in a language which can be communicated to and readily understood by everyone and must not discourage information specialists with boring documents.

Applied research cannot be the exclusive aim of this work. For the renewal of any discipline, fundamental research remains indispensable, though the latter must deal with concrete and everyday problems.

A process of reorganization of research is in order because it would be unlikely for all sectors to advance at the same pace. Bottle-necks have already appeared, particularly in the relationships between population and development, a field which should interest more researchers; while other sectors, of more limited interest for the future, still attract numerous talents. A sensitive problem arises. Research can no longer, as in the past, be moved by spontaneous forces, especially as its cost increases. A determined effort is necessary to establish new directions, while endeavouring not to jeopardize the freedom, scientific neutrality and the structures of the disciplines.

There is not always coincidence between the direction in which sciences move and that which is most beneficial for society. One should leave a great degree of latitude to the investigators, because any discipline should remain open and not stifle innovation. But would it not be desirable to give some orientation to a type of research which is so important and which relates to the very infrastructure of society; and, at the same time, to guide the decisions of the "sponsors", i.e., Governments, international bodies and private foundations? Would it not be desirable to foster a world-wide scientific harmonization and a permanent forum where professionals, men and women, could meet to discuss desirable courses of action for the discipline and their applications, and also to stimulate rigorous thought? It is not enough to know if and how a particular discipline should be helped; a determination should be made of the sector and the approaches that should be promoted.

ORDERS OF MAGNITUDE OF THE WORLD'S URBAN POPULATION IN HISTORY

John V. Grauman *

It is common knowledge that urban populations have never grown so large nor with such speed as in the modern epoch. But little precision can be given to this view unless the new magnitudes can be charted against urban population estimates for historical periods. Aside from their merely historical interest, historical estimates should also make it possible to say both when the new cycle in the transformation of the human habitat seriously gathered speed and how much more urbanized the world has become as compared with other epochs of civilization. The timing of the onset of the modern urban revolution should also help in pin-pointing more exactly the causes which may then have provided the impetus for that development. In the present article, it cannot be claimed that this question is satisfactorily resolved; but the attempt may stimulate efforts by others to bring the matter into sharper focus. It is noteworthy that, thus far, few such attempts have been made.

One isolated instance has been found in which population estimates concerning human settlements of varied size encompass the space of millennia.[1] The source provides no clue as to how these estimates have been made, nor do they appear to be intended to provide more than a very rough scheme of reference. Taking 5,000 inhabitants as the lower size limit for settlements which can be regarded as "urban",[2] the following course of events can be deduced from the figures given in table 1.

If one takes these figures literally, then the world population was already more urbanized at the beginning of the present era than by the year 1850, and the level of urbanization reached about A.D. 1000 was not to be surpassed until late in the nineteenth century. While not impossible, this suggested course of developments raises serious doubts.

Two studies—one by Davis and Hertz,[3] and the

TABLE 1. TOTAL POPULATION, POPULATION IN SETTLEMENTS WITH 5,000 OR MORE INHABITANTS AND PERCENTAGE OF THE LATTER IN TOTAL POPULATION, 2500 B.C.–A.D. 1950

(Population in millions)

Year	Total population	Settlements of 5,000 or more	Percentage in such settlements
B.C.			
2500	101	3	3.1
2000	110	4	3.8
1500	120	4	3.4
1000	132	3	2.3
500	146	9	6.7
B.C./A.D.			
0	165	17	10.3
A.D.			
500	195	13	6.7
1000	245	28	13.5
1500	395	30	8.3
1650	545	30	5.9
1750	728	33	4.8
1800	906	56	6.2
1850	1,160	110	9.5
1900	1,610	290	18.0
1950	2,493	783	31.4

SOURCE: As estimated in C. A. Doxiadis and J. G. Papaioannou, *Ecumenopolis, the Inevitable City of the Future* (Athens, 1974).

other by Hoyt [4]—have been found in which the urban population of the world has been estimated back to 1800, in terms of settlements with at least 5,000 inhabitants. As is shown below, the estimate by Hoyt has probably been well pondered.

The estimate by Davis and Hertz was probably a result of compilations made for various dates, with evidence more plentiful for recent than for earlier dates, especially as regards the smaller urban settlements. This can be deduced as one compares the particular estimates for 1800, 1850, 1900 and 1950, each of which distinguishes urban settlements of three different size categories (table 2).

If one accepts these figures, the world population in 1800, somewhat in excess of 900 million, would have been urbanized only to the extent of 3.0 per cent, no more than the urbanization level suggested by Doxiadis and Papaioannou for as early as 2500 B.C. But it can be plainly demonstrated that the estimates of Davis and Hertz are deficient for 1800 in respect of settle-

* Population Division of the Department of Economic and Social Affairs, United Nations Secretariat. This article was finished shortly before the author's death on 19 April 1976.

[1] C. A. Doxiadis and J. G. Papaioannou, *Ecumenopolis, the Inevitable City of the Future* (Athens, 1974). Reference is made to the table on pp. 400-01.

[2] The reasons that 5,000 inhabitants might be taken as the somewhat arbitrary lower size limit for settlements to qualify as "urban" are briefly discussed below.

[3] Kingsley Davis and Hilda Hertz, tables presented in an unpublished work and reproduced in Philip M. Hauser, ed., *Urbanization in Asia and the Far East*, SS.57.V.7.A (Calcutta, United Nations Educational, Scientific and Cultural Organization, 1957), pp. 56-58.

[4] Homer Hoyt, "The growth of cities from 1800 to 1960 and forecasts to the year 2000", *Land Economics*, vol. 39 (May 1963), p. 170.

TABLE 2. POPULATION IN SETTLEMENTS WITH 5,000 OR MORE IN-HABITANTS, AND IN THREE SIZE CATEGORIES OF SETTLEMENTS, 1800–1950

(Population in millions)

Year	All settlements, 5,000 or more	Settlements within size groups		
		5,000–19,999	20,000–99,999	100,000 or more
1800..........	27.2	5.5	6.1	15.6
1850..........	74.9	24.5	22.9	27.5
1900..........	218.7	70.8	59.3	88.6
1950..........	716.7	214.5	188.5	313.7

SOURCE: As estimated by Kingsley Davis and Hilda Hertz, tables presented in an unpublished work and reproduced in Philip M. Hauser, ed., *Urbanization in Asia and the Far East,* SS.57.V.7.A (Calcutta, United Nations Educational, Scientific and Cultural Organization, 1957), pp. 56-58.

ments smaller than 100,000, though the estimate for the 100,000 or more group may be acceptable. When the figures at the end of each 50-year period are divided by those at the beginning of each period, the following ratios are obtained:

Period	Settlements with population of:		
	5,000–19,999	20,000–99,999	100,000+
1800–1850......	4.45	3.75	1.76
1850–1900......	2.89	2.59	3.22
1900–1950......	3.03	3.18	3.54

The sequence of ratios for the 100,000 or more group appears plausible enough when it is considered that the emergence of numerous cities of such size accelerated in the second half of the nineteenth century, as is well documented in other sources. But since "100,000 or more" is an open-ended group with no upper size limit, it is to be assumed that population in this group at all times grew significantly more rapidly than that of the other two groups which have both an upper and a lower size limit. According to Davis and Hertz, this situation would, indeed, have been true in 1850-1900 and 1900-1950; hence, the detailed estimates for 1850, 1900 and 1950 are at least consistent with one another. But it is exceedingly implausible that population in the two lower size groups should have grown so very rapidly during 1800-1850, when growth in the 100,000 or more group apparently was rather moderate. In relation to the several growth rates for 1850-1900 and 1900-1950, and the perhaps entirely acceptable 1800-1850 growth rate for the 100,000 or more group, one can assume that the 1800-1850 growth rate in each of the two smaller size groups should have been of the order of from 1.40 to 1.60, rather than the rates of 4.45 and 3.75 implied by Davis and Hertz.

Assuming the suggested rates of from 1.40 to 1.60 for the smaller size groups and working backwards from the estimates for 1850, one obtains these adjusted estimates for 1800 as compared with 1850:

Year	All settlements with population of 5,000+	Settlements with population of:		
		5,000–19,999	20,000–99,999	100,000+
1800.....	45.2–49.5	15.3–17.5	14.3–16.4	15.6
1850.....	74.9	24.5	22.9	27.5

Accordingly, the urban population of the world (settlements of 5,000 or more) could have totalled between 45 million and 50 million in 1800, assuming that it was nearly 75 million in 1850 and that, in other respects, the Davis and Hertz estimates were more reliable. The estimate for 1800 might have to be still somewhat larger if it is also assumed that even for 1850, Davis and Hertz somewhat underestimated the population of small towns, which is at least possible.

By coincidence, the range of "from 45 million to 50 million" for the world urban population in 1800 was also estimated by Hoyt in a subsequent publication. This estimate should, perhaps, be taken rather seriously since he undoubtedly extrapolated from the results of incomplete compilations by means of a mathematical rule. It is to be noted this estimate was published in 1963, soon after his 1962 publication in which the rank-size rule was used very extensively.[5]

United Nations estimates of the world's urban population made thus far go back only to 1920.[6] For that year, an urban population of 360 million was estimated; and for the year 1930, a world figure of 450 million. By interpolation, the world's urban population may have totalled 400 million in 1925, a figure that is also used further on. As concerns the United Nations estimates, which are for "urban" population as variously defined in different countries, note should be taken also of their close coincidence with the Davis and Hertz estimate—settlements of 5,000 and more inhabitants—for 1950. For that year, Davis and Hertz estimated 716.7 million; the United Nations estimates, as most recently revised, total 716.8 million.

LOWER SIZE LIMIT USED TO REPRESENT URBAN SETTLEMENTS

Currently, there is a great diversity, from country to country, in the criteria used for statistical purposes to distinguish "urban" from "rural" localities.[7] It is not feasible to discuss here the numerous respects in which the definitions vary, the reasons for their diversity and the consequences for resulting census totals or other estimates of urban population. The very meaning and content of urbanization are currently undergoing marked changes. New concepts have emerged which displace the earlier ideas, and actual developments diverge between the countries of earlier industrialization and the currently developing countries. In earlier times, urban settlements were, on the whole, more clearly set apart from the rest of the human habitat, especially in those times when cities had special charters and privi-

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[5] For estimate of 45 million–50 million, see *ibid.* For rank-size rule, see Homer Hoyt, *World Urbanization, Expanding Population in a Shrinking World,* Technical Bulletin 43 (Washington, D.C., Urban Land Institute, 1962).

[6] *Growth of the World's Urban and Rural Population, 1920-2000* (United Nations publication, Sales No. E.69.XIII.3), p. 48.

[7] "Statistical definitions of urban population and their uses in applied demography", *Demographic Yearbook, 1972* (United Nations publication, Sales No. E/F.73.XIII.1).

leges, and when they were surrounded by walls and moats.

Despite this variation of modern conditions, as mentioned above, the world total of estimates of "urban" population (as variously defined in each country) for 1950 coincides very closely with another estimate independently made for the world population in settlements with 5,000 or more inhabitants. In other words, there are probably some compensating overlaps. If all countries were to adopt a strictly uniform definition, namely, 5,000 inhabitants within localities whose outer contours are defined by the same standards, the resulting "urban" population total would be somewhat larger than actually reported in some countries and somewhat smaller in other countries. The matter has been studied in further detail by Davis,[8] who shows that, for the most part, urban populations are being distinguished as those of settlements above a lower size limit varying from 2,000 to 10,000 inhabitants.

In remote history, places deserving the description of "urban" probably evolved from previous villages in which several activities serving a number of functions were locally combined. The population estimates of urban paleontologists may be highly debatable; but, on the whole, those most ancient cities, already identified as such, are also believed to have had at least 5,000 inhabitants.[9]

It must be recognized that such a size criterion is strictly physical and geographical, referring as it does to a measurable number of people residing within the contours of a zone inhabited at some measurable density. Probably more important for the history of culture is the sociological criterion of "urbanism", which manifests itself in multiple and co-ordinated social roles and economic functions; and, at the same time, in the evolution of corresponding mental attitudes. The intensity of such features can vary from person to person irrespective of the place of residence: physically urban areas may well comprise population segments whose prevailing mentality is still rather rustic, although numerous inhabitants of villages and open countryside may already have absorbed a somewhat "urbane" culture. No doubt, the sociological content of settlements with 5,000 or more inhabitants, as distinct from other settlements, varies from place to place and it must also have varied in the course of time.

Altogether, in historical times, all the regional populations were smaller than they currently are. Outside the urban places they also lived at a lower density. Communications over great distances were so rare that most people knew little about the more distant places. In the circumstances, the "urbane" as well as "urban" character of a small city in the vicinity stood out in much sharper relief than does even a very large city today. An equal level of physical urbanization, in historical periods, could have represented a markedly greater degree of sociological differentiation. In the absence of measures of degrees of qualitative distinction, the present article can only consider the strictly physical aspect of urbanization.

HISTORICAL CITY POPULATION ESTIMATES

The basic source for the present study is the population estimates for long lists of cities, ordered by size and compiled for various historical dates, recently published by Chandler and Fox.[10] These estimates have resulted from many years of systematic research covering all parts of the world, and most of history. Wherever possible, a list of at least 75 cities was brought together which, at the given date, were presumably larger than any other cities wherever they may have been situated. This new source of data, and the use of some suitable mathematical formula, now offers for the first time an opportunity to estimate the combined urban population of the world (settlements of at least 5,000 inhabitants) over the course of numerous centuries.

The reliability of estimates thus obtained will depend upon two assumptions. First, the city estimates presented by Chandler and Fox must be regarded as reliable. Secondly, the formula applied to derive the combined urban population must be considered to be fully appropriate. Obviously, neither of these two conditions can be taken for granted.

The task of identifying and estimating the sizes of the 75 largest cities at any time in history, often based only on the scantiest evidence, is formidable to say the least. Their chief merit consists in the systematic coverage achieved rather than in the accuracy of each individual estimate. Certainly, there will be historical demographers who may take issue with a great many of the figures arrived at by Chandler and Fox. Errors committed in the individual instances will, of course, tend to be compensated to a considerable extent in the aggregate if there persists, throughout the work of those authors, an almost equal likelihood of over-estimate and underestimate. Certainly, they have made every effort to eliminate bias, as can be seen from their explanatory text; but it is less certain that they have been entirely successful. For instance, the undoubted rise of urbanization level in China under the Sung Dynasty (eleventh and twelfth centuries) fails to be reflected in the estimates for Chinese cities in that period. Although there may be flaws in some of the data, the fact remains that no other comparable compilation exists.

The series of city population estimates made by Chandler and Fox begins with the date 1360 B.C., presumably because for that date the first attainment of 100,000 was estimated for a city—Thebes in Egypt.

[8] Kingsley Davis, *World Urbanization, 1950–1970; Volume II: Analysis of Trends, Relationships, and Development*, Population Monograph Series, No. 9 (Berkeley, University of California, 1972).

[9] Gideon Sjoberg, *The Preindustrial City: Past and Present* (Glencoe, Illinois, Free Press, 1960), pp. 27-37.

[10] Tertius Chandler and Gerald Fox, *3000 Years of Urban Growth* (New York and London, Academic Press, 1974), in particular, tables on pp. 300-40.

For those very early times, however, the authors could only bring together the estimates for rather few cities. The first date for which estimates for at least 50 cities are assembled is 430 B.C., then 44 cities in 200 B.C., and numbers of cities fluctuating from 60 to 70 in A.D. 100, 361, 622 and 800. Beginning with A.D. 900, the estimates are generally for 75 cities. Subsequent dates are the years 1000 and 1100, followed by half-century intervals up to 1800, and by quarter-century intervals since that time. Exceptionally, the list of cities for 1800 extends to 536 items, presumably all the cities then in existence which then had at least 20,000 inhabitants; and for 1900, an even longer list of cities—namely, 850—is provided, the smallest of which had 37,000 inhabitants. Use can be made of these long lists for 1800 and 1900 to check results obtained by a method when only the first 75 cities are included, as is shown below. This check is significant because for most of history only the 75 largest cities are kept in evidence.

For each date, the cities are ranked according to their presumable population size but, except for relatively recent dates, the lists also include numerous cities for which no population figure was provided. The resulting gaps can be safely interpolated since the present article is concerned not with each individual city, but with the aggregates of combined city population. It can also be stated that for many cities, in fact for most at some of the earlier dates, the given population figures are considerably rounded. Again, in the aggregate of estimates, the rounding errors probably tend to compensate one another. However, in the method of estimation described below, some influence may be exerted by the rounding error in the smallest city for which a population figure is shown.

It remains to be examined how the Chandler and Fox estimates for the larger and middle-sized cities compare with those of Davis and Hertz.

First, with respect to the category with 100,000 or more population, the following data can be noted. Davis and Hertz estimated a combined population of 15.6 million in 1800, 27.5 million in 1850, 88.6 million in 1900 and 313.7 million in 1950. For 1800 and 1850, these estimates agree well with those of Chandler and Fox, namely, 15.2 million and 28.4 million. Chandler and Fox, however, explicitly estimate the populations of agglomerations, as determined by contours of dense settlement regardless of administrative boundaries, whereas no such specification has been given for the Davis and Hertz estimates. This, no doubt, is the reason why, with the modern growth of suburbs, the Davis and Hertz estimate for 1900 (88.6 million for cities of 100,000 or more) falls short of the Chandler and Fox estimate (103.9 million for agglomerations of such size). Likewise, and no doubt for the same reason, the Davis and Hertz estimate for 1950 (313.7 million) falls short of the most recent United Nations estimate for that date (392.0 million in agglomerations, including suburbs, of 100,000 or more). The fact to be noted is that for cities of 100,000 or

more, the Davis and Hertz estimates for 1800 and 1850 can be taken quite seriously.

As concerns the category with 20,000-99,999 inhabitants, the comparison can be made only for 1800. Here, as has been suggested, Davis and Hertz fell far short, with an estimate of only 6.1 million (see the preceding text) which should be brought at least to the level of from 14.3 million to 16.4 million. The Chandler and Fox series, however, comes to a total of 18.3 million; hence, perhaps an even larger adjustment should have been made. One is led to believe that the world's urban population (settlements of 5,000 or more) in 1800 could have somewhat exceeded the combined figure of 50 million.

Because Davis and Hertz fell so far short, as concerns the smaller cities in 1800, one is led to suspect that they fell at least slightly short also in 1850. In that year, the world's urban population could have easily amounted to 80 million, as compared with the 74.9 million suggested by Davis and Hertz. Based on more recent and plentiful data, the accuracy of their estimate for 1900 need not be questioned at this point, in so far as most of the city suburbs—not included in their estimates for the larger cities—also constituted at least urban localities of 5,000 or more inhabitants. Surburban entities smaller than these settlements, yet part of larger agglomerations, may have been omitted; hence, in 1900 also, Davis and Hertz may still fall slightly short. But the roughness of many of the data which had to be included makes this, perhaps, too fine a consideration.

Tentatively, at this stage, the world's urban population may be put at 50 million in 1800, 80 million in 1850, 225 million in 1900 and 717 million in 1950. The development of other estimates, derived from the long Chandler and Fox series, depends upon the use of a mathematical method which is briefly discussed below.

THE RANK-SIZE RULE

A model often referred to in studies of the population as distributed among localities of diverse size is the so-called "rank-size rule". The same rule is also said to have applications in astronomy, as concerns the comparative frequency of stars of given orders of magnitude. It also resembles the principle of the Pareto curve which finds applications in calculations of the distribution of incomes. According to the simplest form of this rule, when cities and other localities in a large area are listed in the order of their rank in size, the second city tends to be one half the size of the first, the third city one third that size and so forth. In short, the size of each city tends to be in inverse proportion to its rank. This rule is commonly attributed to Zipf,[11] but has been widely debated and there is no agreement as to the reasons why so many observations tend to

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[11] G. K. Zipf, *National Unity and Disunity. The Nation as a Biological Organism*, Bloomington, Ind. (Principia Press, 1941).

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bear it out.[12] In particular, it is most commonly found that the size distribution of some of the largest cities can be quite irregular and that the law of inverse proportionality asserts itself increasingly and more clearly among smaller cities, or among localities of comparatively high rank orders.[13] The size distribution of the world's cities larger than 100,000 in 1950, 1960 and 1970 has been examined by Davis,[14] who found that, except in the largest and smallest urban size groups, the rule tended to be borne out well enough to justify the derivation of presumable numbers of localities and the populations contained therein in several size groups smaller than 100,000, incidentally bearing out that, despite variable national definitions, the current combined "urban" population of the world probably differs little from that contained by localities of 5,000 or more.

The population of cities, ranked by size order, can be plotted on double-logarithmic graph paper, with a horizontal scale representing the rank of each city, and a vertical scale representing its size. If the rank-size rule, in its simplest form, actually applies, the graph of successive cities should follow precisely a diagonal descending at a 45° angle. The slope of such a graph can be considered the "unity slope", as it is measured by the tangent of the angle which, in the case of 45°, is unity. A gentler slope, measured by the tangent, would be less than unity and a steeper slope more than unity. Actual observations, however, often tend to follow a curve which begins with a gentle slope that steepens gradually as it proceeds to cities of smaller and smaller size, possibly tending towards "unity slope" at the limit.

This reasoning is illustrated in figures I-IV. In each figure, a diagonal is also drawn from the position of the largest city downward which represents exact "unity slope". What has just been said is borne out in the figures. Among the largest cities, the distribution is somewhat irregular and the prevailing slope is comparatively gentle. Considerable regularity can be seen at

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[12] *The Determinants and Consequences of Population Trends* (United Nations publication, Sales No. E.71.XIII.5), pp. 215-17.

[13] The simple rank-size rule can be expressed by the formula

$$n_r = \frac{C}{r},$$

where n_r = the population of city n; r is its rank; and C is the population of the largest city. In this form, the rule has a number of convenient mathematical properties. Because of a typical deviance of size distribution among the largest cities, some modified formulae have also been suggested, such as

$$n_r = \frac{C\left(1 + \frac{n-1}{10}\right)}{r}$$

See J. C. Russell, "Late ancient and medieval population", *Transactions of the American Philosophical Society*, vol. 48, part 3 (June 1958), p. 69. This formula becomes equivalent to the simple formula $n_r = \frac{C}{r}$ at the limit where n = unity. However, different effects would result if in the above-mentioned expression $(n - 1)$ were to be divided by some denominator other than the arbitrary 10.

[14] K. Davis, *op. cit.*

least from the fiftieth city downward. The slope steepens progressively until it is almost, but never quite, parallel with the "unity slope" of the diagonal.

It should be pointed out that these observations are for the world as a whole. Observations for individual countries, of course, can often be quite different.

One observation, important in the present context, can be made when the graphs of the four figures are compared with one another. In figure I, which is for 1800, the slope is still markedly gentler than unity down to the smallest cities shown (the data comprise 536 cities); but in figures II-IV, which are for 1900 and more recent years, the slope among the comparatively smaller cities is noticeably steeper. What emerges from these graphs, and especially from figure I, is that the unity slope cannot be taken for granted where the size distribution of cities for the entire world is concerned; and although the slope probably steepens for comparatively small cities, it can remain markedly less than unity for a large part of its range.

In the following discussion, most estimates of urban population (5,000 or more) will have to be derived from a list of the 75 presumably largest cities and, in particular, from the population estimate given for the seventy-fifth city. For the first 75 cities, the combined population is obtained directly from the Chandler and Fox estimates (with interpolations where there are gaps). The population of all settlements smaller than the seventy-fifth, yet larger than the minimum size of 5,000 inhabitants, can vary in accordance with the slope which will have to be assumed.

If the "unity slope" can be assumed, the population (in thousands) of all cities smaller than smallest given, yet larger than 5,000, is obtained as

$$nS(\log_e S - \log_e 5)$$

where S = the size of the smallest city shown (in thousands); n = the rank order of that city, usually 75 (though sometimes also a different figure); 5 = the smallest urban settlement, assumed to have the minimum of 5,000 inhabitants.

If some other slope has to be assumed, the formula becomes more complicated, namely

$$\frac{nS}{1-r}\left[\left(\frac{S}{5}\right)^{\frac{1-r}{r}} - 1\right]$$

where, in addition to the above specifications, r = the slope, to be taken at some value smaller than unity.

An attempt has been made to calculate values of r as found among the largest cities (usually 75) for which city population estimates were actually provided, as a possible basis for speculating on what the value of r might be among cities of smaller size. But, as calculated from these samples of cities, the apparent values of r fluctuated so widely as to prohibit any significant inference. This approach towards estimating the combined urban population, therefore, had to be abandoned.

Figure I. Distribution of cities with more than 20,000 inhabitants,
by size rank and population size, 1800
(Double-logarithmic scale)
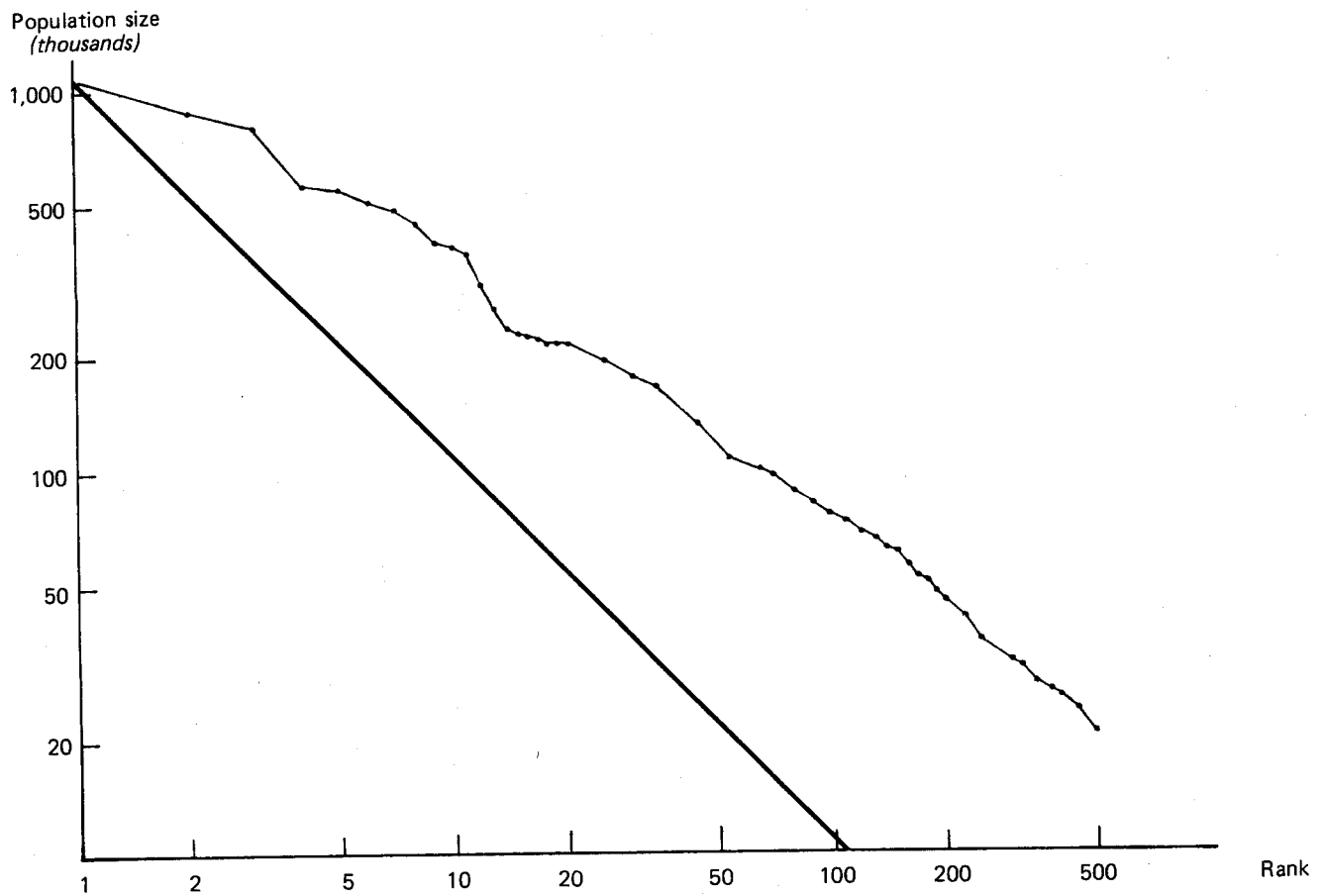
**Figure II. Distribution of cities with more than 37,000 inhabitants,
by size rank and population size, 1900**
(Double-logarithmic scale)
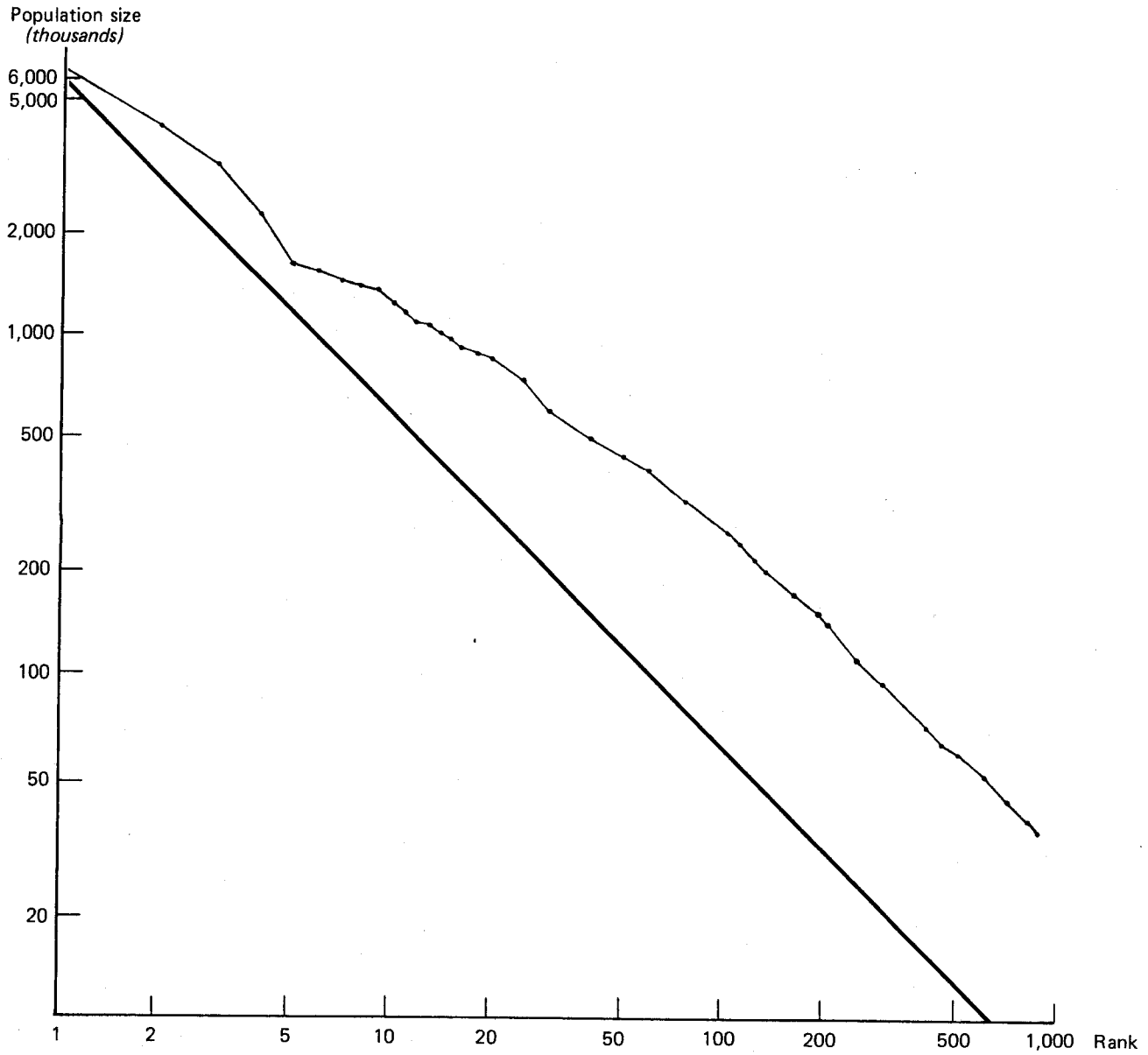
Figure III. Distribution of cities with more than 100,000 inhabitants,
by size rank and population size, 1950
(Double-logarithmic scale)

23

Figure IV. Distribution of cities greater than 200,000 inhabitants, by size rank and population size, 1975
(Double-logarithmic scale)
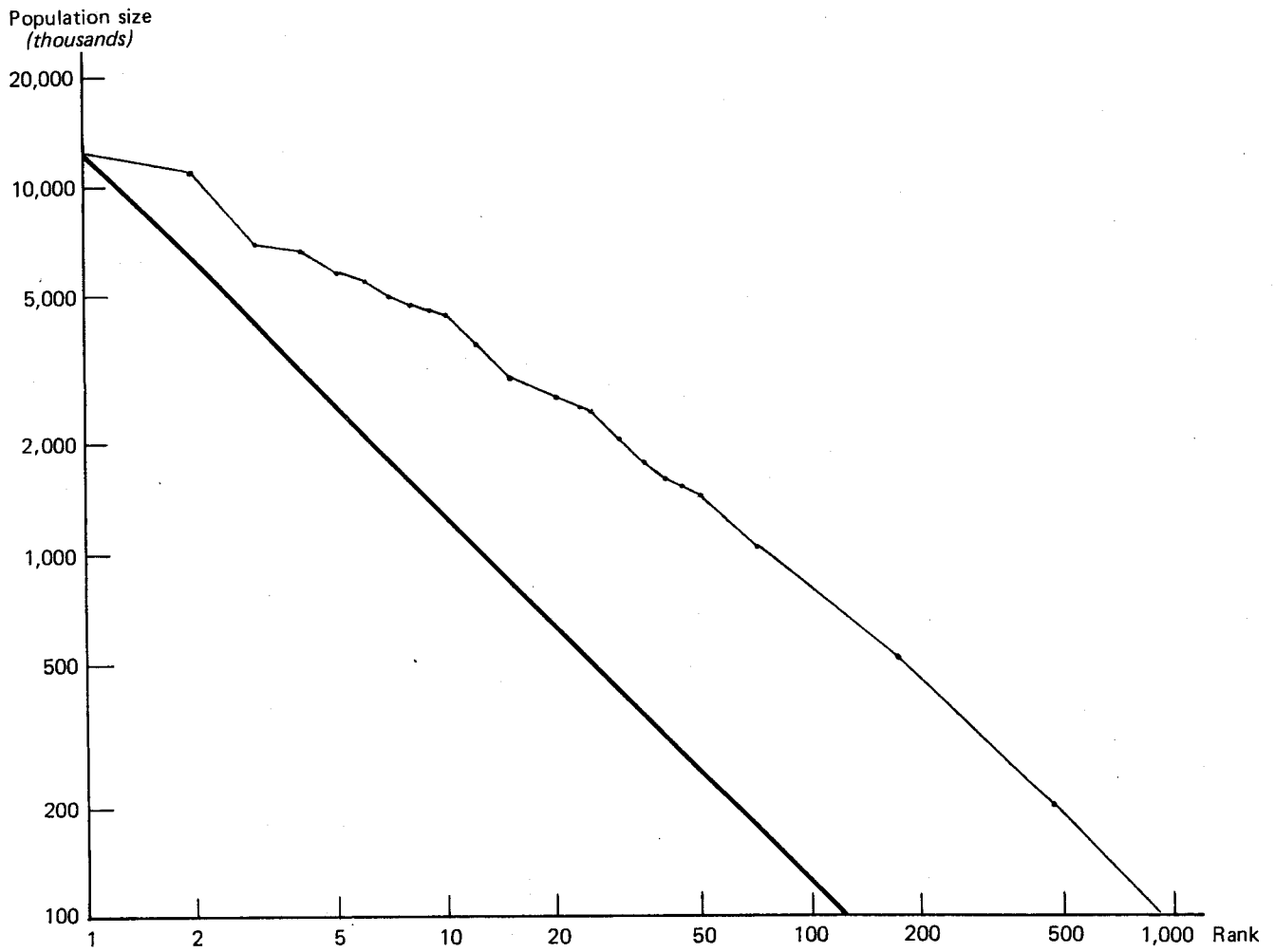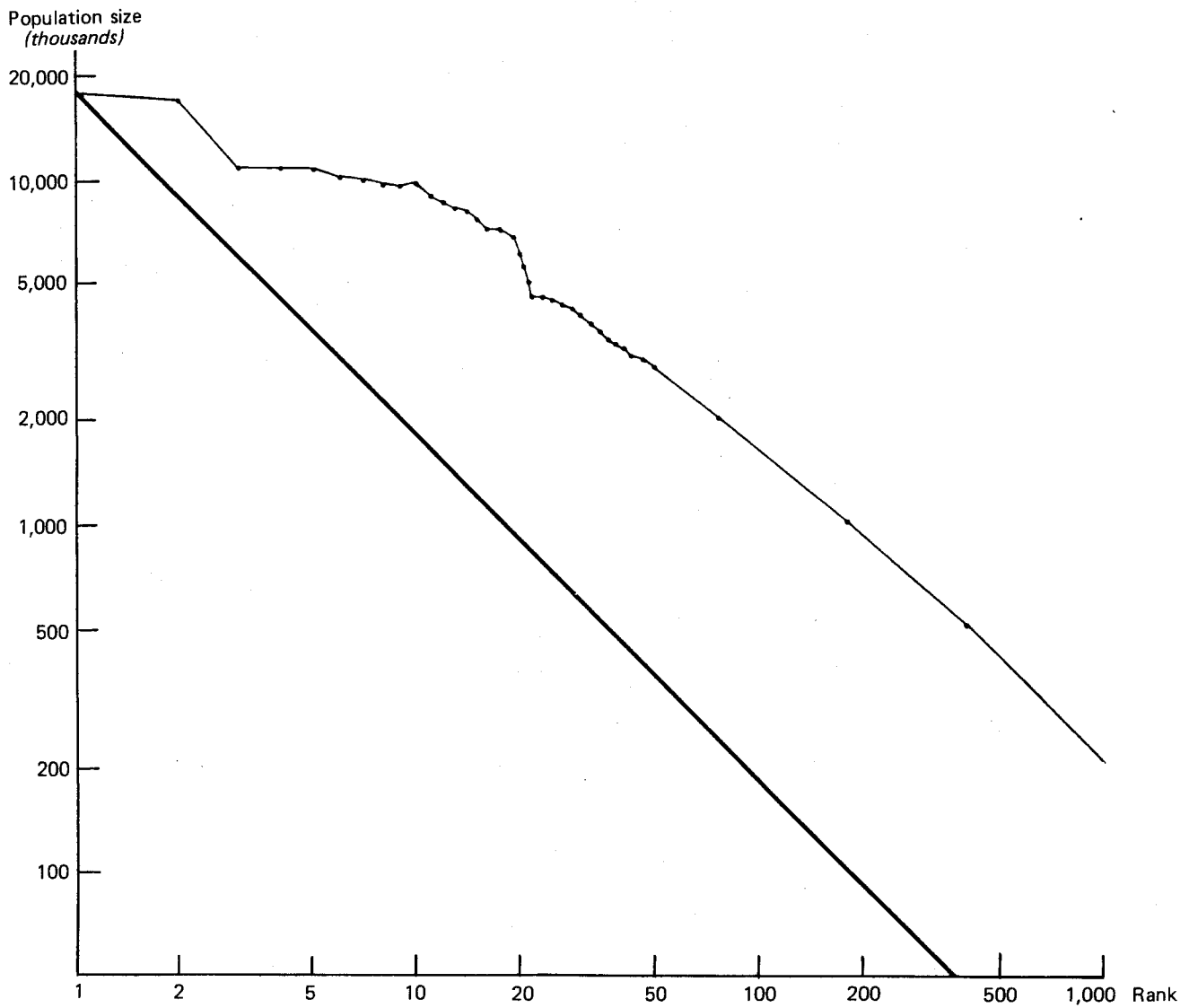
SOURCE: Estimates of the United Nations Secretariat.

Judgement as to appropriate values for *r*, therefore, could be formed only on the basis of observations for 1800 and 1900, two dates for which Chandler and Fox provided much longer lists of cities ranked by population size.

Range of results obtainable by application of the rank-size rule to the city population estimates of Chandler and Fox

Thus, one is left free to assume any reasonable value for *r*, the slope of the size distribution, for cities smaller than those shown by Chandler and Fox. The cities shown, 75 or fewer for each date, are taken as given, and to the sum of their population is added an estimate for the combined population of all other urban settlements with 5,000 or more inhabitants. Assembled in table 3 below are the population (in millions) of the group of cities shown and the estimates of the entire urban population which result from assuming *r* to be equal to 1.0, 0.9, 0.8 or 0.7. It may be seen that large differences can result from variations in the assumption or *r*, and that the relative range of differences widens as one comes to more recent dates.

The foregoing figures for 1800 and 1900 have also been calculated from the data for the 75 largest cities only, the number of cities for which Chandler and Fox have provided data for most other historical dates. The same source, however, also provides a list of the 536 largest cities in 1800, and of the 850 largest in 1900. This list makes it possible to compare the results derived from 75 cities with those derived from more extensive lists. In addition, independent estimates of the world's urban population have also been suggested after a critical examination of the estimates of Davis and Hertz, and of Hoyt, also for those two dates. The alternative estimates of the world's urban population (5,000 or more) are shown in table 4.

Where the extended list of cities was used, only a smaller residual of urban population had to be estimated; hence, the estimates from the extended list vary less than those from 75 cities only. But there is also the additional possibility that beyond the seventy-fifth city, the slope among additional cities within the ex-

TABLE 3. ESTIMATES OF WORLD'S URBAN POPULATION, DERIVED FROM VARIED ASSUMPTIONS OF THE SLOPE OF CITY SIZE DISTRIBUTION, 430 B.C.–A.D. 1925

(Millions)

Year	Population of cities shown	Population of all settlements of 5,000 or more, with r variously assumed			
		r = 1.0	*r* = 0.9	*r* = 0.8	*r* = 0.7
B.C.					
430	3.7	7.1	7.9	9.2	11.3
200	4.3	7.3	8.0	9.1	11.0
A.D.					
100	6.2	11.4	12.6	14.7	18.2
361	5.0	10.3	11.7	13.8	17.4
622	5.7	11.7	13.2	15.5	19.6
800	6.5	13.1	14.8	17.7	22.6
900	7.1	13.2	14.7	17.1	21.2
1000	7.0	13.2	14.7	17.1	21.3
1100	6.8	14.3	16.2	19.2	24.5
1150	6.8	15.2	17.4	21.0	27.4
1200	7.0	14.6	16.6	19.2	25.3
1250	7.0	14.3	16.2	19.2	24.4
1300	7.4	14.5	16.3	19.2	24.3
1350	7.4	14.8	16.7	19.7	25.0
1400	8.0	16.6	18.8	22.4	28.9
1450	8.4	17.1	19.4	23.0	29.6
1500	8.7	17.7	20.1	24.0	31.0
1550	9.6	20.1	23.1	27.8	36.4
1600	11.4	23.7	27.1	32.8	43.3
1650	12.7	23.9	27.1	32.1	41.4
1700	13.2	27.0	31.1	37.7	50.1
1750	13.4	28.8	33.4	40.9	55.2
1800 ᵃ	16.0	35.2	41.2	51.2	70.5
1825	18.7	41.8	49.1	61.7	86.5
1850	25.4	57.8	68.8	88.1	127.3
1875	36.1	90.3	110.5	147.3	225.7
1900 ᵃ	63.9	176.6	224.0	315.3	526.4
1925	104.0	301.3	392.1	574.8	1,023.3

SOURCE: Tertius Chandler and Gerald Fox, *3000 Years of Urban Growth* (New York and London, Academic Press, 1974).
ᵃ Based on 75 cities, though source also gives a longer list of cities.

TABLE 4. ALTERNATIVE ESTIMATES OF WORLD'S URBAN POPULATION, 1800 AND 1900

(Millions)

Year	Population of cities shown	Population of all settlements of 5,000 or more, with r variously assumed			
		r = 1.0	r = 0.9	r = 0.8	r = 0.7
Derived from 75 largest cities only					
1800..................	16.0	35.2	41.2	51.2	70.5
1900..................	63.9	176.6	224.0	315.3	526.4
Derived from extended list of cities					
1800..................	33.7	48.6	51.2	55.9	62.9
1900..................	133.3	196.2	211.6	235.4	264.8
Independent estimates					
1800..................	50.0	...	...	...	...
1900..................	225.0	...	...	...	...

tended list still is less steep than that among the residual cities beyond the extended list. For instance, the same figure of 51.2 million results in 1800 by assuming a constant slope of 0.8 from the seventy-fifth city downward, and likewise by assuming a slope of 0.9 for additional cities beyond the extended list. Although this pattern of distribution may, indeed, have been true in 1800 (assuming the data can be trusted sufficiently), it does not follow that the same pattern is valid also for other moments of time. For instance, in 1900, even on the assumption of $r = 0.9$ throughout the distribution beyond the seventy-fifth city, the estimate derived from 75 cities (224 million) exceeds that derived from the extended list (211.6 million).

This apparent shift in the pattern of city size distribution, between 1800 and 1900, makes it necessary to refer again to the independent estimates already suggested, namely, about 50 million and 225 million. If estimates have to be derived on the basis of 75 cities only, then, apparently, it is nearly correct to assume that $r = 0.8$ in 1800 but that $r = 0.9$ in 1900. This observation makes it uncertain what values of r should be assumed for other dates in history.

Reference can also be made to independent estimates of the world's urban population in 1850 (about 80 million) and in 1925 (about 400 million), as previously discussed. On the basis of 75 cities, the urban population in 1850 could have been 68.8 million if $r = 0.9$, and 88.1 million if $r = 0.8$; hence, a correct value of r for the year 1850 could have been approximately 0.833. Noting that with constant r the apparent increase in the world's urban population would have accelerated very greatly between 1800–1825 and 1825–1850, a moderation in this acceleration could be consonant with r remaining near the value of 0.8 also in 1825, then increasing to 0.833 in 1850, reaching, perhaps, about 0.867 in 1875 (result of interpolation) and about 0.9 in 1900. In 1925, according to the independent estimate, r could have remained at 0.9. The argument is speculative, but it does appear to bring out an important fact. A significant transition probably occurred, roughly between 1825 and 1900, in the pattern of size distribution among the world's urban settlements. If there was such a transition in the particular time period,

what implications does this have for the choice of a value of r at historical dates earlier than 1800?

The period of 1825–1900 was, indeed, unique in numerous respects. Where the growth of cities, large and small, is concerned, factors of special relevance may have been the increasing organization of worldwide and long-distance trade, and the development of new transport vehicles using heavy power engines (steam) the efficient operation of which required expensive installations. The effect may very well have been an alteration in the mutual relationships among cities of varied size, with heightened potentials for growth concentrated particularly in large and very large cities. Such developments, quite conceivably, may explain the apparent shift of r from 0.8 to an eventual 0.9. This line of reasoning suggests that the slope of the distribution at dates earlier than 1800 should have been closer to 0.8 than 0.9, as in earlier times long-distance trade and transport used cheaper vehicles which had more limited geographical scope. Smaller towns and cities, then, may have had a degree of relative local and regional importance, not overshadowed to quite such an extent by the influence of larger but more distant cities. Comparative stabilization of r near a value of 0.9 since 1900 is also plausible, owing to the more extensive use of additional transport vehicles requiring less heavy equipment (combustion engines, electricity).

It should be recognized, nevertheless, that the precise value of r could have fluctuated considerably in the course of world history. In certain times, the emergence of large empires with effective centralized controls could have raised the prominence of comparatively few rather large cities at the expense of comparative stagnation in smaller regional centres. In other times, the political map of the world was fragmented by numerous smaller kingdoms and republics; and even within these minor provinces, a degree of autonomy could have been maintained which further disrupted the unity of the economic space. In such periods, there could have been a relative preponderance of numerous locally significant, yet comparatively small, cities. When all the historical knowledge is brought together, it may become possible to suggest that a larger value of r could have been appropriate in certain epochs, and a smaller value

26

TABLE 5. WORLD'S URBAN POPULATION ESTIMATED WITH A PARTICULAR ASSUMPTION AS TO THE SLOPE OF CITY SIZE DISTRIBUTION, AND WITHIN ASSUMED MARGINS OF ERROR, 430 B.C.–A.D. 1925

(*Millions*)

Year	Assumed *r*	"Medium" estimate	Margin of error (percentage plus or minus)	Limiting estimates	
				"Low"	"High"
B.C.					
430	0.8	9.2	20	7.4	11.0
200	0.8	9.1	20	7.3	10.9
A.D.					
100	0.8	14.7	15	12.5	16.9
361	0.8	13.8	15	11.7	15.9
622	0.8	15.5	15	13.2	17.8
800	0.8	17.7	15	15.0	20.4
900	0.8	17.1	15	14.5	19.7
1000	0.8	17.1	15	14.5	19.7
1100	0.8	19.2	15	15.4	23.0
1150	0.8	21.0	15	17.8	24.2
1200	0.8	19.2	15	16.3	22.1
1250	0.8	19.2	15	16.3	22.1
1300	0.8	19.2	15	16.3	22.1
1350	0.8	19.7	14	16.9	22.5
1400	0.8	22.4	13	19.5	25.3
1450	0.8	23.0	12	20.2	25.8
1500	0.8	24.0	11	21.4	26.6
1550	0.8	27.8	10	25.0	30.6
1600	0.8	32.8	9	29.8	35.8
1650	0.8	32.1	8	29.5	34.7
1700	0.8	37.7	7	35.1	40.3
1750	0.8	40.9	6	38.4	43.4
1800	0.8	51.2	5	48.6	53.8
1825	0.8	61.7	4.5	58.9	64.5
1850	0.8333	80.3	4	77.1	83.5
1875	0.8667	120.3	3.5	116.1	124.5
1900	0.9	224.0	3	217.3	230.7
1925	0.9	392.1	2.5	382.3	401.9

in certain other epochs. Taking the world as a whole, however, it remains possible that increases in the degrees of urban centralization in some regions were sometimes balanced by more dispersed developments in some other regions; hence, for the world as a whole the hypothetical fluctuations in the value of *r* may not have been so wide.

It cannot be pretended that all the relevant historical knowledge bearing on this particular point is currently available. One is, therefore, reduced to making the rather arbitrary assumption that *r* equalled 0.8 at all times up to 1825, that it then shifted progressively to attain 0.9 in 1900, and that it may have remained at the latter magnitude since 1900. The resulting estimates, however, must be assigned varying margins of error; and their relative size must be more considerable in earlier epochs, for which the underlying city population estimates are more questionable, than in the more recent centuries. The assumption of error margins, in its turn, is also quite arbitrary.

SUGGESTED ESTIMATES OF WORLD'S URBAN POPULATION, 430 B.C.–A.D. 1925

Table 5 shows assumed values of *r* for each date, the corresponding "medium" estimate of the world's urban population, the assumed percentage margins of error

(plus and minus) and the corresponding "low" and "high" estimates of urban population.

This series of estimates suggests that the world's urban population could have exceeded 10 million near the beginning of the Christian era, if not even a few centuries before. It could have reached 20 million at any time between A.D. 800 and 1450, 30 million at some time between 1550 and 1700, 40 million at some time in the course of the eighteenth century and about 50 million by 1800. By 1875, these 50 million could have doubled to more than 100 million; and between 1875 and 1900, the world's urban population could have doubled again. At the beginning of the twentieth century, it continued to grow with great speed.

HISTORICAL ESTIMATES OF TOTAL WORLD POPULATION

A historical series of the total world population has been put together by Durand, making use of two sources: one by Carr-Saunders; and another by Clark.[15]

[15] John D. Durand, *Historical Estimates of World Population: An Evaluation* (Philadelphia, Pa., University of Pennsylvania, Population Studies Center, 1974); John D. Durand, "The modern expansion of world population", *Proceedings of the American Philosophical Society*, vol. 111, No. 3 (1967); A. M. Carr-Saunders, *World Population: Past Growth and Present Trends* (New York, Oxford University Press, 1936); and Colin Clark, *Population Growth and Land Use* (New York, St. Martin's Press, 1967), especially p. 64.

The most detailed series of historical estimates of total population is that prepared by Clark. Durand, however, who also published in 1967, arrived at the conclusion that, at least for a period beginning with 1750, there has been a tendency to underestimate somewhat, and that the population estimates for 1750, 1800, 1850 and 1900 should be accordingly increased. In 1974, Durand extended this judgement also to a much longer time series, beginning with the Christian era; but the actual figures he suggested to replace estimates previously made were confined only to the year A.D. 0; and to the years 1000, 1500, 1750 and 1900. Carr-Saunders had previously published a series of world population estimates beginning with 1650, which can be reconciled with Durand's series (1967) when the figures for 1650 are pro-rated upwards by the ratio of the two figures for 1750. The Durand series, which begins with the year A.D. 0, is expressed by ranges rather than definitive figures, narrower, perhaps, than ranges of likely errors. These ranges are described as "indifference ranges", so defined that it cannot be determined whether the lower or the upper figure shown is the "most likely". They are relatively narrower in recent periods, for which there is more definitive information, than in earlier periods, for which there is much uncertainty.

A comparison of the Durand series with the Clark series for combined world totals indicates that at those dates which both series have in common, Clark's estimate is always near the lower limit of Durand's "indifference range". The implicit conclusion appears to be that Clark, as perhaps also various other historical demographers, could have had some bias towards underestimating, possibly owing to reluctance to go too far beyond available evidence. There remains, however, some likelihood that additional population groups could have existed who escaped all records of tax collection, household registration and so forth, that is, groups who lived in such fashion that evidence of their existence has been entirely lost. It would appear fair, therefore, to accept Clark's figures as the "low" estimates; and to add an "indifference range" of a similar width, as suggested by Durand, to arrive at the corresponding "high" estimates. Moreover, because of considerable uncertainty, it is preferable to express corresponding estimates only in rather rounded figures. It is in this way that use has been made of the Clark series up to 1600; of figures by Carr-Saunders for 1650 and 1700, pro-rated to agree with those of Durand for 1750; and of the Durand series from 1750 to 1950. For 1825 and 1875, estimates have been interpolated; for 1925, there is a United Nations estimate; and for 1950, the United Nations estimate is consistent with Durand.

In a few instances, the Clark series does not coincide with the exact dates for which estimates of urban population have been deduced from the Chandler and Fox data. In three cases, the years 361, 622 and 1350 used by Chandler and Fox, it is simply assumed that Clark's world population estimates for 350, 600 and 1340 remain unaffected by the time difference. Clark, however, provided no figure between A.D. 0 and 350; and, for

present purposes, an estimate of total world population for A.D. 100 also is needed. It is known that during the first century of the Christian era, population grew considerably, at least within the confines of the Roman Empire; accordingly, it is assumed that the world estimate for A.D. 0 should be raised by about 5 per cent.

Although, in the course of time, population has increased, the accuracy of the knowledge concerning it has also improved and continues to improve; hence, relative margins of error diminish as one proceeds to more recent dates. For simplicity, the "indifference range" was maintained in a constant width of 100 million for all dates from 1200 onwards, an absolute range which has continued to be appropriate also to the much improved knowledge of current world population. With the increase in both population and the knowledge concerning it, the absolute size of the error range may, in fact, be kept nearly constant.

World urbanization levels, A.D. 100–1950

In table 6, the "indifference ranges" concerning total world population have been combined with the "medium" estimates of the world's urban population to yield percentages of urban in total population. A "high" estimate of total population yields a "low" percentage, and vice versa. For general guidance, a "medium" percentage is also provided.

If one accepts these estimates uncritically, one arrives at the somewhat disturbing view that ever since the beginning of the Christian era and up to 1800, the world's urbanization level could have fluctuated around 5 per cent within a rather narrow range (see last column in table 5), and that previous urbanization levels were not decisively surpassed until the second quarter of the nineteenth century. From what is known of the historical rises and falls of empires, and of the geographical expansion of city-oriented civilizations, this result is somewhat contrary to intuitive expectations. But there is no proof that this view is false. Declines of large cities, in certain epochs, could have been compensated by the growth of more numerous smaller cities. And while urban populations were growing, the rise of urban cultures could also have been paralleled by simultaneous rural developments which favoured a corresponding growth in the rural population. Growing rural populations, in their turn, could have furnished the means of subsistence for growing cities.

From the foregoing discussion, it should also be abundantly clear that these estimates have to be viewed with great caution. Perhaps a tendency to underestimate the total population in earlier epochs still persists among historians. Perhaps Chandler and Fox have over-estimated some of the earlier population sizes of historical cities. Perhaps, contrary to the reasoning given here concerning the rank-size rule, a steeper slope for the distribution of smaller cities could have been appropriate to estimate the combined urban population (5,000 or more) for some of the earlier dates. Several components of the summary estimates presented here could have been variously biased.

28

TABLE 6. ESTIMATES OF TOTAL WORLD POPULATION AND TOTAL URBAN POPULATION, AND PERCENTAGE OF URBAN IN TOTAL POPULATION, A.D. 100–1950

(Millions, except as otherwise indicated)

Year	Total population		Urban population Medium estimate	Percentage of urban in total population		
	High	Low		Low	High	Medium
100	350	280	14.7	4.2	5.2	4.7
361	315	250	13.8	4.4	5.5	5.0
622	300	235	15.5	5.2	6.6	5.9
1000	350	280	17.1	4.9	6.1	5.5
1200	485	385	19.2	4.0	5.0	4.5
1350	475	375	19.7	4.1	5.3	4.7
1500	525	425	24.0	4.6	5.6	5.1
1600	600	500	32.8	5.5	6.6	6.0
1650	650	550	32.1	4.9	5.8	5.4
1700	750	650	37.7	5.0	5.8	5.4
1750	850	750	40.9	4.8	5.5	5.1
1800	1,025	925	51.2	5.0	5.5	5.3
1825	1,150	1,050	61.7	5.4	5.9	5.6
1850	1,300	1,200	80.3	6.2	6.7	6.4
1875	1,475	1,375	110.5	7.5	8.0	7.8
1900	1,700	1,600	224.0	13.2	14.0	13.6
1925	2,025	1,925	400.0 [a]	19.8	20.8	20.3
1950	2,550	2,450	715.0 [a]	28.0	29.2	28.6

[a] Estimate of the United Nations Secretariat.

Nevertheless, the present exercise does appear to suggest that throughout 18 centuries of the current era rather little change occurred in the level of world urbanization. In fact, between 1600 and 1750, the level of urbanization could even have decreased. Historians have, perhaps, given insufficient attention to the possibility that rural settlement, owing to government and business organization, could have expanded significantly at certain times in concurrence with the growth of cities. Though most of humanity throughout history has inhabited rural settlements, the historical facts on record are mostly those pertaining to cities. Knowledge of the history of rural settlement has remained scant.

Should it be true, on the whole, that the world's urbanization changed so little over such a long period of time, the upsurge of urbanization levels which began early in the nineteenth century is all the more remarkable.

Asia and Europe, 1000–1975

Urbanization probably began more than 4,000 years ago in the region currently constituting Iraq. From there, it spread first to other ancient centres of river civilization on the Nile, the Indus and the Yellow River of China. Urban cultures eventually came to encompass the globe; but, at all times, the bulk of the world's population has been shared by Asia and Europe. Table 7 shows the distribution, at any time, of the 25 largest cities distributed among five world areas. For historical reasons, Europe is here defined to include the area currently comprising Turkey and the Union of Soviet Socialist Republics.

It may be seen that most of the world's comparatively large cities were situated in south Asia until the tenth century of the Christian era. Another long period followed, from 1000 until about 1825, when compara-

tively large cities were particularly numerous in East Asia, namely, in China, Japan and Korea. From 1850 to 1950, the concentration of the world's largest cities was especially noteworthy in Europe; but eventually very large cities emerged rapidly also in North and South America, rivalling and most recently even overtaking those of Europe. Quite recently also, large-scale urbanization again became prominent in Asia. In historical periods, Northern Africa had a number of comparatively major urban centres. Currently, urbanization proceeds most rapidly in Africa, but not many African cities have yet attained a very large size.

Viewed in this perspective, it is clear that the modern upsurge of urbanization, currently world-wide, began in Europe. With interpolations too tedious to reproduce, it can be calculated that about 1890 more than one half of the world's urban population was situated in Europe, even excluding Russia and Turkey. During that period of European ascendancy, a world view prevailed which, in particular, differentiated between Europe and Asia, though it must be recognized that Asia is much larger and culturally much more diverse. But the leadership of Europe in world urbanization has been a passing phase. Not only has Europe already been overtaken in the sizes and numbers of cities, but various other things have happened as the twentieth century progressed, so that a world view still favoured at its beginning has already lost most of its previous relevance. Nevertheless, the contrasting developments, as between Asia and Europe, remain of historical interest.

Chandler and Fox provide separate tables of historical cities for each of the traditional continents,[16] and the lists of cities are long enough for Asia and Europe to warrant the use of the rank-size rule in the manner

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[16] Chandler and Fox, *op. cit.*, pp. 10-78.

TABLE 7. DISTRIBUTION OF THE 25 LARGEST CITIES AMONG FIVE AREAS OF THE WORLD,
430 B.C.–A.D. 1975

Year	World total	South Asia [a]	East Asia [b]	Europe [c]	Africa	Americas
B.C.						
430.........	25	11	8	4	2	0
200.........	25	13	7	2	3	0
A.D.						
100.........	25	15	4	3	3	0
361.........	25	13	4	4	3	1
622.........	25	17	5	1	1	1
800.........	25	12	9	2	2	0
900.........	25	12	9	2	2	0
1000.........	25	7	10	4	4	0
1100.........	25	8	9	3	5	0
1150.........	25	8	9	3	5	0
1200.........	25	7	10	4	4	0
1250.........	25	5	10	6	4	0
1300.........	25	6	10	6	3	0
1350.........	25	10	9	3	3	0
1400.........	25	7	8	8	2	0
1450.........	25	7	9	8	1	0
1500.........	25	8	9	6	2	0
1550.........	25	8	9	8	0	0
1600.........	25	5	10	8	2	0
1650.........	25	10	9	5	1	0
1700.........	25	5	10	8	2	0
1750.........	25	5	11	8	1	0
1800.........	25	4	11	9	1	0
1825.........	25	4	11	9	1	0
1850.........	25	4	8	11	0	2
1875.........	25	4	3	13	1	4
1900.........	25	2	4	12	0	5
1925.........	25	2	3	13	0	7
1950 [d].......	25	2	3	10	1	9
1975 [d].......	25	7	5	5	1	7

[a] Excluding China, Japan, Korea (area currently comprising the Democratic People's Republic of Korea and the Republic of Korea), Turkey and the Union of Soviet Socialist Republics.
[b] China, Japan and Korea (comprising the area described above in [a]).
[c] Including Turkey and the Union of Soviet Socialist Republics.
[d] Estimates of the United Nations Secretariat.

already explained. Again, use was made as far as possible of the data for the 75 largest cities in each of the two continents.[17] By coincidence and unexpectedly, it was found that the assumption of a slope (r) of 0.9 in the separate instances of Asia and Europe gave results consistent with those already calculated for the world as a whole (where up to 1825 r was assumed as 0.8), always leaving a somewhat plausible residual for the remainder of the world, other than Asia and Europe. This assumption, therefore, was used to calculate the urban and rural populations of Asia and Europe for all dates up to 1900. For 1925, 1950 and 1975, the estimates of urban population are those of the United Nations.

Estimates of the total populations of Asia and Europe (Europe including Turkey and the Soviet Union) were derived by interpolations utilizing conjointly the estimates of Clark and Durand in the manner already discussed. In table 8, only the centre of the range be-

tween "high" and "low" estimates is represented. It must be emphasized that most of these historical estimates are very rough indeed, and that they should be interpreted only with extreme caution.

The figures in this table show that in historical time, Asia had always had at least twice the total population of Europe, and by 1975, almost three times (Europe here considered to include Turkey and the Soviet Union). The urban population of Asia also was about twice that of Europe at any time between 1300 and 1750. Thereafter, the European urban population grew more rapidly, overtook that of Asia by about 1850 and grew so rapidly that, despite rapid growth also in Asia, by 1900 the urban population of Europe was twice that of Asia. In the twentieth century, the comparative trends were reversed; and recently, the urban population of Asia has again begun to outnumber that of Europe, including here also Turkey and the Soviet Union.

It appears, on the other hand, that in 1300, if not before, the level of urbanization was already somewhat higher in Europe than in Asia. But, with the error margins of such estimates, it is uncertain whether the differ-

[17] Only 60 cities could be used for Europe in 1000 and 1200, dates for which the list of Asian cities was too short for the present purpose. For Asia, 56 cities could be used for 1300, and 67 cities for 1400.

30

(Millions)

Year	Total population		Urban population		Percentage urban	
	Asia	Europe [a]	Asia	Europe [a]	Asia	Europe [a]
1000............	...	50	...	3.5	...	7.0
1200............	...	70	...	4.3	...	6.2
1300............	200	90	11.0	5.7	5.5	6.5
1400............	225	70	13.2	5.5	5.9	7.8
1500............	250	80	15.0	6.7	6.0	8.4
1600............	325	100	18.1	9.3	5.6	9.3
1700............	425	150	20.3	11.1	4.8	7.4
1750............	490	175	24.5	12.2	5.0	7.0
1800............	620	220	28.4	16.7	4.6	7.6
1850............	790	295	32.4	34.0	4.1	11.5
1900............	910	440	61.6	124.9	6.8	28.4
1925 [b].........	1,030	520	102.5	192.5	10.0	37.0
1950 [b].........	1,347	593	215.0	292.2	16.0	49.3
1975 [b].........	2,216	768	572.2	491.0	25.8	63.9

[a] Defined to include Turkey and the Union of Soviet Socialist Republics.
[b] Estimates of the United Nations Secretariat.

ence is fully significant. The apparent decline in the urbanization level of Europe between 1600 and 1700 may, perhaps, have to be associated with the consequences of the Thirty Years' War. In Asia, if the estimates are not severely misleading, there appears to have been an almost continuous decline in urbanization level from 1500 to 1850, despite steady increases in the size of the urban population. The rural population of Asia, it would appear, then grew more rapidly than the urban, but with the scant historical knowledge currently available, it would be difficult to ascertain the possible reasons for such a course of development. After 1850, most likely, urbanization levels in Asia began to rise significantly; but by that time, Europe was already considerably ahead of Asia. By 1900, Asia was about as urbanized as Europe had been in 1750; and as of 1975, the urbanization level in Asia can be compared with that of Europe shortly before 1900.

CURRENTLY MORE DEVELOPED AND LESS DEVELOPED REGIONS: ESTIMATES FOR 1800–2000

Although much doubt must be expressed concerning estimates of urban population and urbanization level in periods prior to the nineteenth century, decidedly safer ground exists for dates from 1800 onwards. In addition, the Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat has carried out projections of urban and rural population up to 2000.[18] Because divergent developments have differentiated certain regions of the world in the past two centuries, and large differences in living conditions are certain to persist for some time to come, it is of particular interest to distinguish the currently more devel-

oped regions from the currently less developed regions. Among the more developed regions are counted Europe (excluding Turkey), the Soviet Union, Japan, the United States of America, Canada, Argentina, Chile, Uruguay, Australia and New Zealand. The remainder of the world is considered to constitute the less developed regions.

An effort has been made to utilize Durand's estimates of total population; estimates of urban population by Hoyt, by Davis and Hertz, and, for more recent dates, by the United Nations; and separate estimates of urban population in the more developed and less developed regions derived from the city data of Chandler and Fox. The tentative estimates for Asia and Europe, discussed above, have also been taken into consideration. No precise rule has been followed. Several further methods of applying the rank-size rule were tried, such as on the basis of cities in the 100,000-199,999 group, and on the basis of cities shown, from the smallest given by Chandler and Fox up to cities twice that size. In each instance, somewhat different results were obtained. These results were then tested for consistency and adjusted in such ways to round figures so that a combined picture for the world and its two sets of regions could be obtained which is plausible, at least in so far as concerns both consistency with all the available data and consistency among the resulting figures themselves. From all that has been said before, apparent consistency should not mislead the user of these figures into thinking that they can be very accurate. They are, perhaps, as accurate as currently available knowledge permits.

The results of these estimating procedures are shown in the following tables. Table 9 shows, by 25-year intervals, the total urban and rural population of the world from 1800 to 2000 (as projected), percentage urbanization levels, average annual growth rates; and the world-wide "force of urbanization", defined as the absolute difference between the rate of urban population

[18] The most recent projections appear in "Trends and prospects in urban and rural population, 1950-2000, as assessed in 1973-1974" (ESA/P/WP.54).

TABLE 9. ESTIMATES OF TOTAL, URBAN AND RURAL POPULATIONS OF THE WORLD; PERCENTAGE URBAN; AND AVERAGE ANNUAL GROWTH RATES IN TOTAL, URBAN AND RURAL POPULATION IN 25-YEAR PERIODS, 1800–2000

Year	Population (millions)			Percentage urban	Annual growth rates (percentage)			Force of urbanization [a]
	Total	Urban	Rural		Total	Urban	Rural	
1800............	978	50	928	5.1	...	...	...	...
1825............	1,110	60	1,050	5.4	0.5	0.7	0.5	0.2
1850............	1,262	80	1,182	6.3	0.5	1.2	0.5	0.7
1875............	1,420	125	1,295	8.8	0.5	1.8	0.4	1.4
1900............	1,650	220	1,430	13.3	0.6	2.3	0.4	1.9
1925............	1,950	400	1,550	20.5	0.7	2.4	0.3	2.1
1950............	2,501	717	1,784	28.7	1.0	2.3	0.6	1.7
1975............	3,968	1,556	2,412	39.2	1.8	3.1	1.2	1.9
2000............	6,254	2,997	3,257	47.9	1.8	2.6	1.2	1.4

[a] Urban growth rate minus rural growth rate.

TABLE 10. CURRENTLY MORE DEVELOPED AND LESS DEVELOPED REGIONS OF THE WORLD: ESTIMATES OF TOTAL, URBAN AND RURAL POPULATIONS; PERCENTAGE URBAN AND AVERAGE ANNUAL PERCENTAGE GROWTH RATE, 1800–2000

Year	Population (millions)			Percentage urban	Annual growth rates (percentage)			Force of urbanization [a]
	Total	Urban	Rural		Total	Urban	Rural	
Currently more developed regions								
1800............	273	20	253	7.3	...	...	...	...
1825............	305	25	280	8.2	0.4	0.9	0.4	0.5
1850............	352	40	312	11.4	0.6	1.9	0.4	1.5
1875............	435	75	360	17.2	0.8	2.5	0.6	1.9
1900............	575	150	425	26.1	1.1	2.8	0.6	2.2
1925............	715	285	430	39.9	0.9	2.6	0.0	2.6
1950............	857	459	398	53.6	0.7	1.9	−0.3	2.2
1975............	1,132	784	348	69.3	1.1	2.1	−0.5	2.6
2000............	1,360	1,090	270	80.1	0.7	1.3	−1.0	2.3
Currently less developed regions								
1800............	705	30	675	4.3	...	...	...	...
1825............	805	35	770	4.3	0.5	0.6	0.5	0.1
1850............	910	40	870	4.4	0.5	0.5	0.5	0.0
1875............	985	50	935	5.0	0.3	0.9	0.3	0.6
1900............	1,075	70	1,005	6.5	0.3	1.3	0.3	1.0
1925............	1,235	115	1,120	9.3	0.6	1.7	0.4	1.3
1950............	1,644	258	1,386	15.7	1.1	3.2	0.8	2.4
1975............	2,836	772	2,064	27.2	2.2	4.4	1.6	2.8
2000............	4,984	1,906	3,078	39.0	2.2	3.6	1.6	2.0

[a] Urban growth rate minus rural growth rate.

TABLE 11. ESTIMATED PERCENTAGE OF TOTAL, URBAN AND RURAL POPULATIONS OF THE WORLD IN CURRENTLY MORE DEVELOPED AND LESS DEVELOPED REGIONS, 1800–2000

Year	Percentage share of world population in currently:					
	More developed regions			Less developed regions		
	Total	Urban	Rural	Total	Urban	Rural
1800...........	27.9	40.0	27.3	72.1	60.0	72.7
1825...........	27.5	41.7	26.7	72.5	58.3	73.3
1850...........	27.9	50.0	26.4	72.1	50.0	73.6
1875...........	30.6	60.0	27.8	69.4	40.0	72.2
1900...........	34.8	68.9	29.5	65.2	31.1	70.5
1925...........	36.7	71.2	27.7	63.3	28.8	72.3
1950...........	34.3	64.1	22.3	65.7	35.9	77.7
1975...........	28.5	50.4	14.4	71.5	49.6	85.6
2000...........	21.7	36.4	8.3	78.3	63.6	91.7

growth and the rate of rural population growth.[19] Table 10 breaks down the same data according to the currently more developed and less developed regions. Table 11 shows how the share of the more developed

regions in total, urban and rural populations of the world has changed since 1800, and how it may continue to change up to the year 2000. Lastly, the increases in the percentage level of urbanization are illustrated also in figure V. Some of the inferences which can be made from comparisons of these figures are so striking that they are amply justified despite imperfections in the particular estimates and projections.

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[19] The "force of urbanization", so defined, is a basic parameter of the method of projection used by the United Nations with respect to each individual country. See *ibid.*

Figure V. Levels of urbanization of the world and of the currently
more developed and less developed regions, 1800-2000
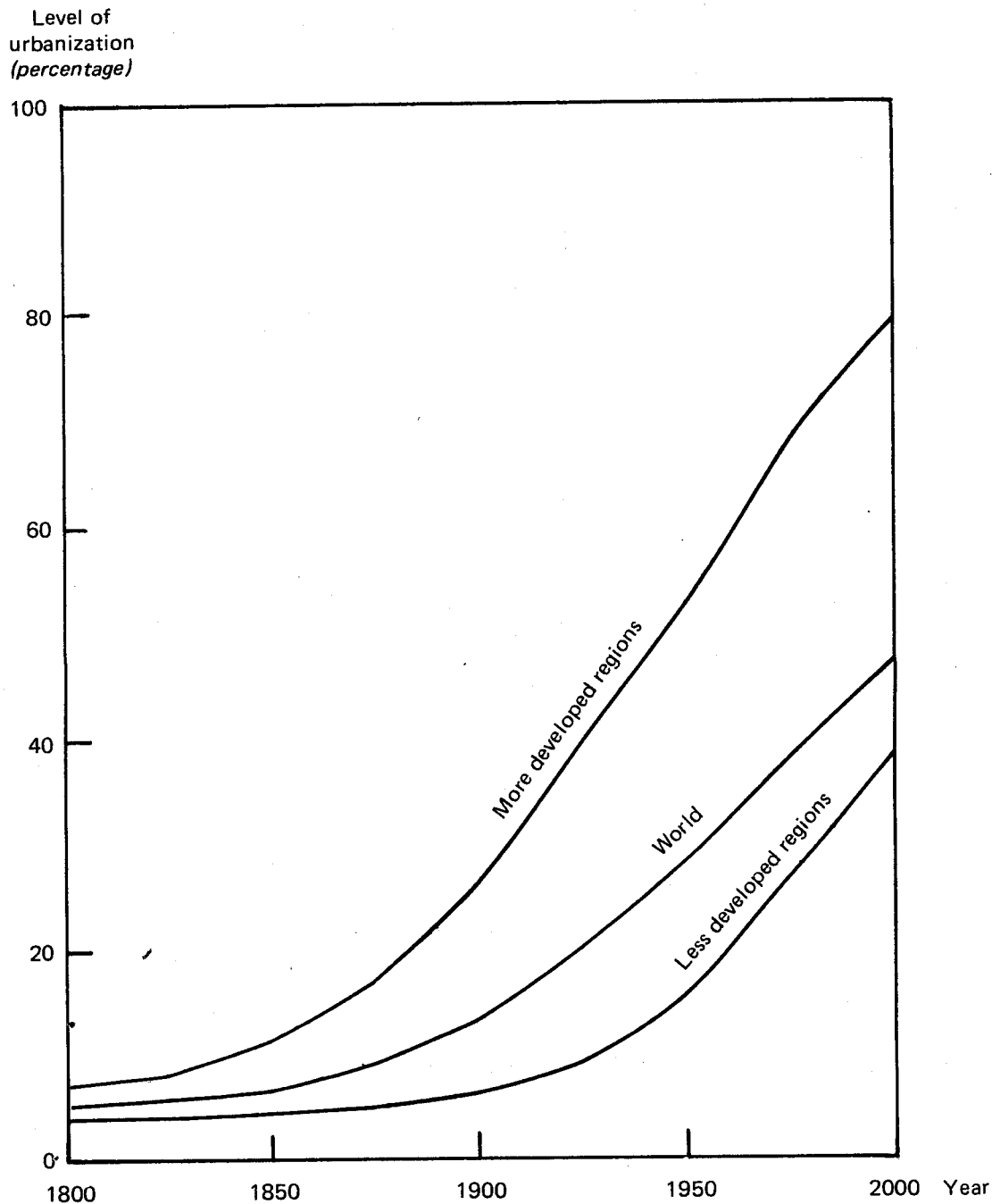
THE ECONOMIC AND SOCIAL IMPLICATIONS OF DEMOGRAPHIC TRENDS IN EUROPE UP TO AND BEYOND 2000

Jean Bourgeois-Pichat *

The Economic Commission for Europe (ECE) has just published a remarkable collection of data on the past, present and future demographic situation in Europe.[1] All who are familiar with this type of report will realize the tremendous amount of work that went into the research and the time it must have taken. Time, of course, is the worst enemy of any of these panoramas of the future. Population projections, in fact, may be obsolete as soon as they are published, so unpredictable is the demographic behaviour of populations and so much does it challenge the wisdom of demographers. The report produced by the ECE secretariat is not immune from that danger.[2] When all the population projections worked out by the individual countries had been compiled, it was found that Europe had greatly altered its demographic behaviour. In recent years, fertility has declined much faster than had been expected and some "most likely" projections are, in many cases, higher than current figures. Therefore, in order to enable the reader to take this decline into account, the ECE secretariat had the sensible idea of preparing two theoretical projections on the following bases. The first (projection I) assumes that from 1976 onwards the decline in fertility will level off at a gross reproduction rate equal to unity. The second (projection II) assumes that the decline in fertility will continue until 1986, when it will level off at a gross reproduction rate equal to 0.750. These two theoretical projections are worked out for major regions[3] and cover the period 1970–2030. The "most likely" projections are shown by country for the period 1970–2000.

Before considering the economic and social consequences of demographic trends in Europe, one must obviously select the projections to be used, bearing in mind the most recent statistics. That is the purpose of the first chapter of this article.

THE DEMOGRAPHIC SITUATION IN EUROPE IN 1975

Available data

Table 1 shows the gross reproduction rates under the "most likely" projections and under theoretical projections I and II (see tables at end of chapter). Table 2

gives, separately for males and females, the expectation of life at birth under the same projections. Table 3 shows the differences in expectation of life at birth between males and females. These are the data which must be compared with the most recent available statistics on the demographic situation in Europe. Recent statistics are never very detailed, and one must ordinarily be satisfied with crude birth and death rates. First of all, therefore, it is necessary to convert tables 1 and 2 in terms of crude birth and death rates. This is the purpose of table 4. The most recent crude birth and death rates are given in table 5. One can then compare the "projections" with the most recent statistics, beginning with the "most likely" projections and at first considering only natality.

Natality under the "most likely" projections in the light of recent observations

Figure I permits the comparison of projections with recent statistics. There are several curves for most of the countries. Curves A, I, O and II relate to natality; and curves (a), (b) and (c) relate to mortality. For reasons that are given below, some of the curves are missing for Bulgaria, Ireland, Belgium and Portugal. Lastly, Albania does not appear in figure I because of its special demographic situation.[4] In order to compare recent natality with natality under the "most likely" projections, it is sufficient to use curves O and A. The first, curve O, represents observed crude birth rates; curve A represents birth rates under the "most likely" projections. The relationship between these two curves makes it possible to see whether, in each country, the "most likely" projection is an extension of recent development. It should be stated at once that, for many countries, the answer is in the negative; the "most likely" projection is not in keeping with the trend.

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[1] See *Economic Survey of Europe in 1974* (United Nations publication, Sales No. E.75.II.E.16), part two, "Post-war demographic trends in Europe and the outlook until the year 2000".

[2] This remark obviously relates only to that part of the report which deals with population projections. Everything relating to past trends and the current situation remains valid and is of incalculable value.

[3] Eastern Europe, Northern Europe, Western Europe, Southern Europe and the Union of Soviet Socialist Republics.

[4] Until recently (1960), contraception was practically unknown to the Albanian population and the demographic situation was that of a developing country, characterized by uncontrolled fertility. Since 1960, the "demographic revolution" has been in progress; and in 10 years, there has been a very sharp decrease in natality (see table 5). It is difficult to select a projection for this country when the situation is so fluid.

TABLE 1. GROSS REPRODUCTION RATE UNDER THEORETICAL PROJECTIONS I AND II, BY REGION, 1970–2030; AND UNDER "MOST LIKELY" PROJECTIONS, BY COUNTRY, 1970–2000

	1970–1975	1975–1980	1980–1985	1985–1990	1990–1995	1995–2000	2000–2030
Eastern Europe							
Theoretical projection I	1.080	1.000	1.000	1.000	1.000	1.000	1.000
Theoretical projection II	1.080	0.850	0.800	0.750	0.750	0.750	0.750
Bulgaria	0.978 [a]	——————General fertility rate constant——————					
Czechoslovakia	1.016	1.016	1.016	1.016	1.016	1.016	
German Democratic Republic	1.024	1.012	1.002	0.998	1.000	1.007	
Hungary	0.947	0.989	0.985	1.006	1.006	1.006	
Poland	1.024	0.939	0.896	0.894	0.900	0.905	
Romania	1.270	1.200	1.200	1.200	1.200	1.200	
Northern Europe							
Theoretical projection I	1.100	1.000	1.000	1.000	1.000	1.000	1.000
Theoretical projection II	1.100	0.850	0.800	0.750	0.750	0.750	0.750
Denmark	0.975 [b]	0.972	1.006	1.047	1.063	1.072	
Finland	0.780	0.750	0.740	0.730	0.730	0.730	
Ireland [c]	1.850 [d]	...	...	...	...	...	
Norway	1.209 [a]	—— Age-specific fertility rate constant at 1972 level ——					
Sweden	0.970	0.970	0.970	0.970	0.970	0.970	
United Kingdom	1.160	1.160	1.140	1.140	1.130	1.130	
Western Europe							
Theoretical projection I	1.020	1.000	1.000	1.000	1.000	1.000	1.000
Theoretical projection II	1.020	0.850	0.800	0.750	0.750	0.750	0.750
Austria	1.042	0.916	0.908	0.908	0.908	0.908	
Belgium	1.015 [a]	0.930	0.930	0.930	0.930	0.930	
France [e]	1.170 [a]			1.040	1.040	1.040	
Germany, Federal Republic of	0.887	0.838	0.838	0.838	0.838	0.838	
Netherlands	1.051	1.044	1.037	1.037	1.037	1.037	
Switzerland	0.920	0.900	0.880	0.840	0.840	0.820	
Southern Europe							
Theoretical projection I	1.220	1.000	1.000	1.000	1.000	1.000	1.000
Theoretical projection II	1.220	1.050	0.850	0.750	0.750	0.750	0.750
Albania	2.370	2.200	1.980	1.730	1.470	1.280	
Greece	1.145	1.185	1.116	1.116	1.109	1.109	
Italy	1.108	1.072	1.050	1.040	1.034	1.032	
Portugal	1.260	1.180	1.180	1.180	1.180	1.180	
Spain	1.404	1.382	1.368	1.353	1.330	1.310	
Yugoslavia	1.140	1.110	1.110	1.110	1.110	1.110	
USSR							
Theoretical projection I	1.200	1.000	1.000	1.000	1.000	1.000	1.000
Theoretical projection II	1.200	0.850	0.800	0.750	0.750	0.750	0.750
"Most likely" projection	1.180	1.190	1.210	1.220	1.210	1.200	

SOURCE: For annual rates of Bulgaria, Ireland, Norway, Belgium and France, *Population and Vital Statistics Report; Data Available as of 1 April 1974*, Statistical Papers, series A, vol. XXVI, No. 2 (ST/ESA/STAT/SER. A/1081).
[a] Annual rates for 1972.
[b] Data for 1973–1974.

[c] Duration-specific marital fertility rates declining by 1 per cent per annum for durations of less than five years and by 2 per cent per annum for longer durations.
[d] Annual rates for 1970.
[e] Average number of children per couple, declining from 2.25 in 1970 to 2.0 in 1985 and remaining constant thereafter.

This is true of all the countries of Western Europe,[5] even such countries as the Federal Republic of Germany and Switzerland which have adopted relatively low fertility rates for their "most likely" projection. Recent development indicates even lower rates.

It is true also of the countries of Northern Europe, excluding Ireland, which has always had its own pattern of population development. Only Finland, in its "most likely" projection, has forecast fertility low enough for that prospect to be in keeping with the trend. In Southern Europe, natality is declining; but the move-

ment is not sizable enough to enable one to assert that the "most likely" projections are already out of date. However, those projections, if they materialized, would entail for all the countries of Southern Europe a halt in the decline of natality which would be in contrast with the trend of the past 15 years. It is likely that the forces which are operating in Western and Northern Europe to bring about a decline in natality are also active in Southern Europe; in fact, it is probably those forces which are responsible for the decline observed there. It does not, therefore, appear unreasonable to expect a continuation of the decline to levels deviating from those of the "most likely" projections.

Eastern Europe is more diversified. In one country, the German Democratic Republic, the "most likely" projection is largely out of date. In fact, both the

[5] In Belgium, the crude birth rate under the "most likely" projection is not known. Curve A cannot, therefore, be plotted and compared with curve O. However, Belgium has always had a pattern of population development comparable to that of its neighbours.

35

TABLE 2. EXPECTATION OF LIFE AT BIRTH UNDER THEORETICAL PROJECTIONS I AND II, BY REGION, 1970–2030; AND UNDER "MOST LIKELY" PROJECTIONS, BY COUNTRY, 1970–2000

(Years and tenths of years)

Region and country	1970–1975	1975–1980	1980–1985	1985–1990	1990–1995	1995–2000	2000–2005	2005–2010	2010–2015	2015–2020	2020–2025	2025–2030
						Male						
Eastern Europe												
Theoretical variant I	67.0	...	...	...	...	71.5	...	...	...	72.3	72.3	72.3
Theoretical variant II	67.0	...	...	...	...	71.5	...	...	...	72.3	72.3	72.3
Bulgaria	68.8	...	...	...	...	71.6						
Czechoslovakia	66.9	66.9	67.8	67.8	68.7	68.7						
German Democratic Republic	70.0	70.7	71.2	71.6	71.8	72.0						
Hungary	66.0	66.0	66.0	66.0	66.0	66.0						
Poland	67.2	67.9	68.5	69.4	70.6	71.8						
Romania	65.1	...	...	...	...	71.2						
Northern Europe												
Theoretical variant I	72.0	72.3	72.3	72.3	72.3	72.3	72.3	72.3	72.3	72.3	72.3	72.3
Theoretical variant II	72.0	72.3	72.3	72.3	72.3	72.3	72.3	72.3	72.3	72.3	72.3	72.3
Denmark	70.5	70.7	70.9	71.1	71.2	71.4						
Finland	66.5	66.5	66.7	66.8	66.8	66.8						
Ireland	69.3	...	...	...	71.9	71.9						
Norway	71.0	...	...	...	...	71.0						
Sweden	72.0	...	...	...	...	72.3						
United Kingdom	69.1	69.6	70.2	70.7	71.1	71.6						
Western Europe												
Theoretical variant I	70.0	...	...	...	...	72.2	...	72.3	72.3	72.3	72.3	72.3
Theoretical variant II	70.0	...	...	...	...	72.2	...	72.3	72.3	73.3	72.3	72.3
Austria	66.6	66.6	66.6	66.6	66.6	66.6						
Belgium	67.7	...	...	...	...	...						
France	69.9	70.9	71.5	...	...	73.2						
Germany, Federal Republic of	67.4	67.4	67.4	67.4	67.4	67.4						
Netherlands	70.6	70.2	69.5	69.5	69.5	69.5						
Switzerland	69.8	70.4	71.0	71.7	72.3	73.0						
Southern Europe												
Theoretical variant I	65.0	...	...	...	...	70.8	...	...	...	...	...	72.3
Theoretical variant II	65.0	...	...	...	...	70.8	...	...	...	...	...	72.3
Albania	67.2	68.0	68.7	69.3	69.8	70.3						
Italy	69.2	70.0	70.6	71.1	71.6	72.0						
Greece	70.1	...	72.3	...	...	...						
Portugal	66.4	65.6	65.6	65.6	65.6	65.6						
Spain	69.6	69.6	69.6	69.6	69.6	69.6						
Yugoslavia	65.4	66.4	67.2	67.6	68.1	68.5						
USSR												
Theoretical variant I	66.0	...	...	...	...	71.2	...	...	...	...	72.3	72.3
Theoretical variant II	66.0	...	...	...	...	71.2	...	...	...	...	72.3	72.3
USSR	66.5	67.1	67.7	68.3	68.9	69.5						

German Democratic Republic and the Federal Republic of Germany show very similar movements. The "most likely" projection also appears to have been overtaken by events in Romania. After natality had reached a peak in 1967, following the adoption of restrictions on abortion facilities the year before, the decline in natality resumed; and in 1973, curve O was clearly below curve A.

The other four countries—Bulgaria, Czechoslovakia, Hungary and Poland—have recently experienced increases in natality. These increases appear to have followed amendments to the laws concerning abortion. If this is so, they would be similar to the changes that occurred in Romania in 1967; and, as in Romania, they would be temporary. The decline would be arrested for a few years but would resume as the population adapted itself to the new legislation. It may be noted in passing that these changes in natality entail large variations in the absolute number of births (see table 6), which will undoubtedly give rise to problems when the generations affected by these irregularities reach school age, then the age of entry into employment, and ultimately, retirement age.

The trend in the Union of Soviet Socialist Republics is similar to that in the countries of Eastern Europe, where there has recently been an increase in natality; as in the case of those countries, one may wonder how temporary the increase will be.

To sum up, there is every reason to believe that Western and Northern Europe will draw the other regions of Europe in their wake, making the "most likely" projections outdated everywhere in Europe.

TABLE 2 (continued)

Region and country	1970–1975	1975–1980	1980–1985	1985–1990	1990–1995	1995–2000	2000–2005	2005–2010	2010–2015	2015–2020	2020–2025	2025–2030
						Female						
Eastern Europe												
Theoretical variant I.....	74.0	...	...	...	...	77.0	...	...	77.5	77.5	77.5	77.5
Theoretical variant II....	74.0	...	...	...	...	77.0	...	...	77.5	77.5	77.5	77.5
Bulgaria..............	72.7	...	...	...	...	75.7						
Czechoslovakia........	73.3	73.3	74.0	74.0	74.7	74.7						
German Democratic Republic...........	75.3	76.0	76.5	76.9	77.3	77.5						
Hungary.............	72.1	72.1	72.1	72.1	72.1	72.1						
Poland..............	73.2	73.6	74.1	74.8	75.6	76.4						
Romania............	69.5	...	...	...	...	75.0						
Northern Europe												
Theoretical variant I.....	77.0	...	...	77.5	77.5	77.5	77.5	77.5	77.5	77.5	77.5	77.5
Theoretical variant II.....	77.0	...	...	77.5	77.5	77.5	77.5	77.5	77.5	77.5	77.5	77.5
Denmark.............	75.2	75.4	75.6	75.7	75.8	75.9						
Finland.............	74.2	74.3	74.4	74.5	74.5	74.5						
Norway.............	76.0	...	...	...	...	...						
Sweden..............	76.9	...	...	...	...	78.2						
United Kingdom......	75.3	75.9	76.5	77.1	77.6	78.0						
Western Europe												
Theoretical variant I.....	76.0	...	...	...	...	77.4	77.5	77.5	77.5	77.5	77.5	77.5
Theoretical variant II....	76.0	...	...	...	...	77.4	77.5	77.5	77.5	77.5	77.5	77.5
Austria..............	73.7	73.7	73.7	73.7	73.7	73.7						
Belgium.............	73.5	...	...	...	...	...						
France..............	75.2	76.9	77.2	...	...	77.9						
Germany, Federal Republic of........	73.5	73.5	73.5	73.5	73.5	73.5						
Netherlands..........	76.3	76.5	76.6	76.6	76.6	76.6						
Switzerland..........	75.1	75.8	76.5	77.3	78.1	78.9						
Southern Europe												
Theoretical variant I.....	70.0	...	...	...	...	75.8	...	...	...	...	...	77.5
Theoretical variant II....	70.0	...	...	...	...	75.8	...	...	...	...	...	77.5
Albania.............	69.9	70.7	71.5	72.2	72.8	73.4						
Italy................	75.1	75.6	76.1	76.5	76.8	77.0						
Greece..............	73.8	...	75.9	...	...	...						
Portugal.............	70.5	72.0	72.0	72.0	72.0	72.0						
Spain...............	74.7	74.7	74.7	74.7	74.7	74.7						
Yugoslavia...........	69.7	70.5	71.1	71.4	71.7	72.1						
USSR												
Theoretical variant I.....	74.0	...	...	...	...	77.0	...	...	77.5	77.5	77.5	77.5
Theoretical variant II.....	74.0	...	...	...	...	77.0	...	...	77.5	77.5	77.5	77.5
USSR...............	74.3	74.7	75.2	75.6	76.0	76.5						

*Natality under theoretical projections I and II
in the light of recent observations*

The next aspect to be considered is how the recent changes in natality stand in relation to theoretical projections I and II. These prospects were not computed by country, and the comparison cannot be made directly. It is necessary first to estimate for each country what changes might have been in keeping with the assumptions of the theoretical projections. That is the purpose of curves I and II. In plotting these curves, there was assumed to be proportionality between gross reproduction rates and birth rates. Table 7 indicates, taking the United Kingdom of Great Britain and Northern Ireland as an example, how this operation was performed for projection II.

Similar computations for all the countries resulted in the part of curve II consisting of a broken line. This part runs from 1985 to 2000. The same method was applied to theoretical projection I, using (in column (4) of table 7) a gross reproduction rate equal to unity. The computation covered the time from 1975–1980 to 1995–2000. This resulted in curve II, plotted on the graph as a broken line. This method is, of course, "rough and ready" and could not be used if the figures in columns (2) and (4) were very different.[6]

One may now compare the recent trend of crude birth rates with the developments that would give assumptions of fertility in keeping with theoretical projections I and II (declining gross reproduction rate stabilizing in 1976 at 1.000 (projection I) and declining gross reproduction rate stabilizing at 0.750 in 1986

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[6] Some idea of the error involved can be obtained if one applies the method by region in order to estimate crude birth rates under projection II on the basis of the crude birth rates under projection I. This is the purpose of table 8. It will be seen that up to 2000 the deviations are small. After that year, they become larger; but, in fact, the method has not been used beyond 2000.

TABLE 3. DIFFERENCE BETWEEN MALE AND FEMALE LIFE EXPECTANCY UNDER THEORETICAL PROJECTIONS I AND II, BY REGION, 1970–2030; AND UNDER "MOST LIKELY" PROJECTIONS, BY COUNTRY, 1970–2000

(Years and tenths of years)

Region and country	1970–1975	1975–1980	1980–1985	1985–1990	1990–1995	1995–2000	2000–2005	2005–2010	2010–2015	2015–2020	2020–2025	2025–2030
Eastern Europe												
Theoretical variant I	7.0	...	...	...	...	5.5	...	...	...	5.2	5.2	5.2
Theoretical variant II	7.0	...	...	...	...	5.5	...	...	...	5.2	5.2	5.2
Bulgaria	4.9					4.1						
Czechoslovakia	6.4	6.4	6.2	6.2	6.0	6.0						
German Democratic Republic	5.3	5.3	5.3	5.3	5.5	5.5						
Hungary	6.1	6.1	6.1	6.1	6.1	6.1						
Poland	6.0	5.7	5.6	5.4	5.0	4.6						
Romania	4.4	...	...	...	...	3.8						
Northern Europe												
Theoretical variant I	5.0	...	...	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2
Theoretical variant II	5.0	...	...	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2
Denmark	4.7	4.7	4.7	4.6	4.6	4.5						
Finland	7.7	7.8	7.7	7.7	7.7	7.7						
Ireland	4.8	...	...	...	4.6	4.6						
Norway	5.0	...	...	...	...	5.9						
Sweden	4.9	...	...	...	...	...						
United Kingdom	6.2	6.3	6.3	6.4	6.5	6.4						
Western Europe												
Theoretical variant I	6.0	...	...	...	...	5.2	5.2	5.2	5.2	5.2	5.2	5.2
Theoretical variant II	6.0	...	...	...	...	5.2	5.2	5.2	5.2	5.2	5.2	5.2
Austria	7.1	7.1	7.1	7.1	7.1	7.1						
Belgium	5.8	...	...	...	...	...						
France	6.3	6.0	5.7	...	...	4.7						
Germany, Federal Republic of	6.1	6.1	6.1	6.1	6.1	6.1						
Netherlands	5.7	6.3	7.1	7.1	7.1	7.1						
Switzerland	5.3	5.4	5.5	5.6	5.8	5.9						
Southern Europe												
Theoretical variant I	5.0	...	...	...	...	5.0	...	...	...	...	...	5.2
Theoretical variant II	5.0	...	...	...	...	5.0	...	...	...	...	...	5.2
Albania	2.7	2.7	2.8	2.9	3.0	3.1						
Italy	5.9	5.6	5.5	5.4	5.2	5.0						
Greece	3.7	...	3.6	...	...	...						
Portugal	4.1	6.4	6.4	6.4	6.4	6.4						
Spain	5.1	5.1	5.1	5.1	5.1	5.1						
Yugoslavia	4.3	4.1	3.9	3.8	3.6	3.6						
USSR												
Theoretical variant I	8.0	...	...	...	...	5.8	...	...	...	...	5.2	5.2
Theoretical variant II	8.0	...	...	...	...	5.8	...	...	...	...	5.2	5.2
USSR	7.8	7.6	7.5	7.3	7.1	7.0						

(projection II)). All that is necessary is to compare, for each country, curve O with curves I and II.

In the case of countries where the "most likely" projection is not in keeping with the trend, theoretical projection I also deviates from that trend. The recent movement of crude birth rates appears rather to be in the direction of theoretical projection II.

Some countries, such as the German Democratic Republic and the Federal Republic of Germany, are already at the level of theoretical projection II. Others, such as Austria, Switzerland and Finland (probably also Belgium), are already very close to theoretical projection II.[7] For others, such as France, the Netherlands, the United Kingdom, Denmark, Sweden and Norway, the recent movement is towards theoretical projection II, which will, in every case, be reached sooner or later. In figure I, curve O (observed crude birth rates) has been inserted to connect with the dotted part of curve II (the part arrived at through computations similar to those shown in table 7).

For the other countries—those of Southern and Eastern Europe and the Soviet Union—a similar insertion has been made, but it does not purport, in those cases, to represent a virtually certain change in natality. In some of these countries, as stated above, natality has been declining for about the past 10 years, but it is still far from the level of theoretical projection II. In view of the common cultural background of the countries of Europe, it does not appear unreasonable to think that the pattern established by Western and Northern Europe and by the German Democratic Republic may spread to the other countries of Europe, which would then move along the line represented by curve II. For many of them, that would represent a large decline in natality, but not, after all, a larger one

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[7] Luxembourg also reached the "theoretical projection" level in 1974.

TABLE 4. CRUDE BIRTH RATES AND DEATH RATES UNDER THEORETICAL PROJECTIONS I AND II, BY REGION, 1970–2030; AND UNDER "MOST LIKELY" PROJECTIONS, BY COUNTRY, 1970–2000

(Rates per 1,000 population)

Region and country	Crude birth rates							Crude death rates						
	1970–1975	1975–1980	1980–1985	1985–1990	1990–1995	1995–2000	2025–2030	1970–1975	1975–1980	1980–1985	1985–1990	1990–1995	1995–2000	2025–2030
Eastern Europe														
Theoretical variant I	16.8	...	...	...	...	14.1	13.1	10.0	...	...	...	...	10.1	12.9
Theoretical variant II	16.8	...	...	...	...	10.9	8.4	10.0	...	...	...	...	10.8	16.3
Bulgaria [a]	16.0	15.4	14.6	14.3	14.3	14.3		10.0	10.5	10.9	11.4	11.8	12.1	
Czechoslovakia	16.6	16.4	15.3	14.6	14.6	14.8		12.2	12.5	12.1	12.2	11.7	11.7	
German Democratic Republic	13.9	14.6	15.0	14.7	14.1	13.7		12.4	12.7	12.8	12.4	11.7	10.9	
Hungary	15.0	16.0	14.6	13.5	13.6	14.2		12.0	12.6	12.9	13.2	13.4	13.6	
Poland	16.9	16.8	15.6	14.1	13.2	12.9		8.5	9.1	9.5	9.6	9.6	9.6	
Romania	19.3	18.4	17.6	17.4	17.8	17.5		10.2	10.2	10.2	10.2	10.1	10.0	
Northern Europe														
Theoretical variant I	15.5	...	...	...	...	14.0	13.0	9.4	...	...	...	...	11.7	13.0
Theoretical variant II	15.5	...	...	...	...	10.8	8.4	9.4	...	...	...	...	12.5	16.3
Denmark	14.8 [b]	14.5	14.7	15.2	15.2	14.8		10.8 [b]	11.1	11.5	11.8	11.9	11.9	
Finland	13.2	12.9	12.5	11.9	11.0	10.2		9.9	10.8	11.5	12.0	12.5	12.9	
Ireland	22.4	23.3	23.6	23.1	22.1	21.2		10.8	10.1	9.6	9.1	8.5	8.3	
Norway	15.5	15.4	15.5	15.5	15.2	14.8		10.3	10.8	11.3	11.6	11.7	11.7	
Sweden	14.3	13.7	13.1	13.0	13.1	13.0		10.0	11.3	11.8	12.3	12.8	12.9	
United Kingdom	16.1	16.4	16.4	16.7	16.5	16.1		11.8	11.7	11.7	11.6	11.3	10.9	
Western Europe														
Theoretical variant I	14.3	...	...	...	...	13.9	13.1	10.7	...	...	...	...	11.0	13.0
Theoretical variant II	14.3	...	...	...	...	10.6	8.5	10.7	...	...	...	...	11.6	16.4
Austria	13.9	12.9	13.8	14.4	13.9	13.0		13.2	13.6	13.9	13.9	13.6	13.3	
Belgium	14.6 [c]							12.3 [c]						
France [a]	16.7	17.0	16.5	15.6	15.2	14.9		10.6	10.5	10.3	10.2	10.3	10.3	
Germany, Federal Republic of	12.0	11.5	12.1	12.8	12.3	11.3		12.2	13.0	13.6	13.9	14.0	14.0	
Netherlands	16.5	18.1	16.7	16.2	15.6	14.7		8.5	9.0	9.3	9.6	9.8	10.0	
Switzerland	13.4	13.4	13.3	12.9	11.9	10.9		10.2	11.0	10.9	11.0	11.0	10.8	
Southern Europe														
Theoretical variant I	17.8	...	...	...	...	14.3	12.7	10.3	...	...	...	...	10.2	12.6
Theoretical variant II	17.8	...	...	...	...	11.3	8.4	10.3	...	...	...	...	10.5	15.1
Albania	33.4	32.4	30.8	27.8	24.1	21.5		6.5	6.1	5.8	5.6	5.5	5.5	
Italy	16.1	15.2	14.9	15.0	14.9	14.5		9.8	10.0	10.3	10.7	10.9	10.8	
Greece	16.0	14.9	15.6	16.1	16.0	15.7		9.6	10.0	10.4	10.6	10.8	11.2	
Portugal	19.4	18.3						10.6	10.7					
Spain	19.4	19.3	19.6	19.6	19.3	18.8		8.9	9.2	9.6	9.9	10.0	10.1	
Yugoslavia	18.2	18.3	17.8	17.2	16.5	16.1		9.2	9.4	9.5	9.7	9.9	10.2	
USSR														
Theoretical variant I	18.2	...	...	...	...	14.6	13.2	8.3	...	...	...	...	9.2	12.2
Theoretical variant II	18.2	...	...	...	...	11.3	8.7	8.3	...	...	...	...	9.7	15.0
USSR	17.8	18.7	19.4	18.9	17.6	16.9		7.9	8.4	8.9	9.3	9.4	9.4	

a Data for the first year of each five-year period.
b Data for 1973–1974.
c Data for 1970.

TABLE 5. CRUDE BIRTH RATES, DEATH RATES AND RATES OF NATURAL INCREASE IN EUROPE, BY COUNTRY, 1960–1975

(Rates per 1,000 population)

Year	Czechoslovakia [a] Birth rate	Death rate	Rate of natural increase	German Democratic Republic [a] Birth rate	Death rate	Rate of natural increase	Hungary [a] Birth rate	Death rate	Rate of natural increase
				Eastern Europe					
1960	15.9	9.2	6.7	17.0	13.6	3.4	14.7	10.2	4.5
1961	15.8	9.2	6.6	17.6	13.0	4.6	14.0	9.6	4.4
1962	15.7	10.0	5.7	17.4	13.7	3.7	12.9	10.8	2.1
1963	16.9	9.5	7.4	17.6	13.0	4.6	13.1	9.9	3.2
1964	17.2	9.6	7.6	17.2	13.3	3.9	13.1	10.0	3.1
1965	16.4	10.0	6.4	16.5	13.5	3.0	13.1	10.7	2.4
1966	15.6	10.0	5.6	15.7	13.2	2.5	13.6	10.0	3.6
1967	15.1	10.1	5.0	14.8	13.3	1.5	14.6	10.7	3.9
1968	14.9	10.7	4.2	14.4	14.2	0.2	15.1	11.2	3.9
1969	15.5	11.2	4.3	14.0	14.3	−0.3	15.0	11.3	3.7
1970	15.9	11.6	4.3	13.9	14.1	−0.2	14.7	11.6	3.1
1971	16.5	11.5	5.0	13.8	13.8	0.0	14.6	11.9	2.7
1972	17.4	11.1	6.3	11.8	13.8	−2.0	14.7	11.4	3.3
1973	18.9	11.6	7.3	10.6	13.7	−3.1	15.0	11.8	3.5
1974	19.8	11.7	8.1	10.6	13.5	−2.9	17.8	12.0	2.8
1975	19.5	11.9	7.6	10.8	14.8	−4.0	18.1	12.5	5.6
	Bulgaria			Poland			Romania		
1960	17.8	8.1	9.7	22.6	7.5	15.1	19.1	8.7	10.4
1961	17.4	7.9	9.5	20.9	7.6	11.3	17.5	8.7	8.8
1962	16.7	8.7	8.0	19.8	7.9	11.9	16.2	9.2	7.0
1963	16.4	8.2	8.2	19.2	7.5	11.7	15.7	8.3	7.4
1964	16.1	7.9	8.2	18.1	7.6	10.5	15.2	8.1	7.1
1965	15.3	8.2	7.1	17.3	7.4	9.9	14.6	8.6	6.0
1966	14.9	8.3	6.6	16.7	7.3	9.4	14.3	8.2	6.1
1967	15.0	9.0	6.0	16.3	7.8	8.5	27.4	9.3	18.1
1968	16.9	8.6	8.3	16.2	7.6	8.6	26.3	9.6	16.7
1969	17.0	9.5	7.5	16.3	8.1	8.2	23.3	10.1	13.2
1970	16.3	9.1	7.2	16.8	8.2	8.6	21.1	9.5	11.6
1971	15.9	9.7	6.2	17.1	8.7	8.4	19.6	9.5	10.1
1972	15.3	9.8	5.5	17.4	8.0	9.4	18.8	9.2	9.6
1973	16.3	9.4	6.9	17.9	8.3	9.6	18.1	9.8	8.3
1974	17.2	9.8	7.4	18.4	8.2	10.2	19.3	11.1	8.2
1975	16.6	10.3	6.3	18.9	8.8	10.1	...	...	...

TABLE 5 (*continued*)

Year	Austria [a] Birth rate	Death rate	Rate of natural increase	Belgium [a] Birth rate	Death rate	Rate of natural increase	France [a] Birth rate	Death rate	Rate of natural increase	Germany, Federal Republic of [a] Birth rate	Death rate	Rate of natural increase
						Western Europe and USSR						
1960	17.9	12.7	5.2	16.9	12.4	4.5	17.9	11.4	6.5	17.5	11.6	5.9
1961	18.6	12.1	6.5	17.3	11.6	5.7	18.2	10.8	7.4	18.0	11.2	6.8
1962	18.7	12.7	6.0	16.8	12.2	4.6	17.7	11.5	6.2	18.0	11.4	6.6
1963	18.8	12.8	6.0	17.1	12.6	4.5	18.2	11.7	6.5	18.4	11.8	6.6
1964	18.5	12.3	6.2	17.2	11.7	5.5	18.2	10.7	7.5	18.4	11.1	7.3
1965	17.9	13.0	4.9	16.4	12.2	4.2	17.8	11.2	6.6	17.8	11.6	6.2
1966	17.6	12.5	5.1	15.9	12.1	3.8	17.6	10.8	6.8	17.8	11.6	6.2
1967	17.4	13.0	4.4	15.3	12.0	3.3	17.0	11.0	6.0	17.2	11.6	5.6
1968	17.2	13.1	4.1	14.8	12.7	2.1	16.7	11.1	5.6	16.3	12.4	3.9
1969	16.5	13.4	3.1	14.7	12.5	2.2	16.7	11.4	5.3	15.1	12.4	2.7
1970	15.2	13.4	1.8	14.7	12.3	2.4	16.7	10.7	6.0	13.4	12.1	1.3
1971	14.6	13.1	1.5	14.6	12.3	2.3	17.2	10.8	6.4	12.7	11.9	0.8
1972	13.9	12.7	1.2	14.0	12.0	2.0	17.0	10.6	6.4	11.4	11.8	−0.4
1973	13.0	12.3	0.7	13.3	12.1	1.2	16.5	10.7	5.8	10.2	11.8	−1.6
1974	12.8	12.4	0.4	12.6	11.9	0.7	15.3	10.6	4.7	10.1	11.7	−1.7
1975	12.4	13.0	−0.6	12.1	12.3	−0.2	14.1	11.1	3.0	9.6	12.1	−2.4

40

TABLE 5 (continued)

Year	Birth rate	Death rate	Rate of natural increase	Birth rate	Death rate	Rate of natural increase	Birth rate	Death rate	Rate of natural increase	Birth rate	Death rate	Rate of natural increase
	Luxembourg [a]			Netherlands			Switzerland			USSR		
1960	16.0	11.8	5.2	20.8	7.7	13.1	17.6	9.7	7.9	24.9	7.1	17.8
1961	16.1	11.4	4.7	21.3	7.6	13.7	18.1	9.3	8.8	23.8	7.2	16.6
1962	16.0	12.6	3.4	20.9	8.0	12.9	18.4	9.7	8.7	22.4	7.5	14.9
1963	15.8	12.1	3.7	20.9	8.0	12.9	19.1	9.9	9.2	21.2	7.2	14.0
1964	16.0	11.8	4.2	20.7	7.7	13.0	19.2	9.1	10.1	19.6	6.9	12.7
1965	16.0	12.3	3.7	19.9	8.0	11.9	18.8	9.3	9.5	18.4	7.3	11.1
1966	15.6	12.4	3.2	19.2	8.1	11.1	18.3	9.3	9.0	18.2	7.6	10.6
1967	14.8	12.4	2.4	18.9	7.9	11.0	17.7	9.1	8.6	17.4	7.6	9.8
1968	14.2	12.3	1.9	18.6	8.3	10.3	17.1	9.3	7.8	17.2	7.7	9.5
1969	13.5	12.5	1.0	19.2	8.4	10.8	16.5	9.3	7.2	17.0	8.1	9.9
1970	13.2	12.3	0.9	18.3	8.4	9.9	15.8	9.1	6.7	17.4	8.2	9.2
1971	13.2	12.9	0.3	17.2	8.4	8.8	15.2	9.2	6.0	17.8	8.2	9.6
1972	11.9	11.9	0.0	16.1	8.5	7.6	14.3	8.9	5.4	17.8	8.5	9.3
1973	10.9	11.9	−1.0	14.5	8.2	6.3	13.6	8.8	4.8	17.7	8.7	9.0
1974	11.5	12.6	−1.1	13.7	8.1	5.6	12.9	8.5	4.4	18.2	8.7	9.5
1975	11.2	12.2	−1.1	13.2	8.5	4.7	12.2	8.6	3.6	18.2	9.3	8.9

Year	Birth rate	Death rate	Rate of natural increase	Birth rate	Death rate	Rate of natural increase	Birth rate	Death rate	Rate of natural increase
				Northern Europe					
	Ireland [a]			Norway [a]			Sweden [a]		
1960	21.4	11.5	9.9	17.3	9.1	8.2	13.7	10.0	3.7
1961	21.2	12.3	8.9	17.1	9.2	7.9	13.9	9.8	4.1
1962	21.8	12.0	9.8	17.3	9.4	7.9	14.2	10.2	4.0
1963	22.2	11.9	10.3	17.3	10.1	7.2	14.8	10.1	4.7
1964	22.4	11.5	10.9	17.7	9.5	8.2	16.0	10.0	6.0
1965	22.1	11.5	10.6	17.8	9.5	8.3	15.9	10.1	5.8
1966	21.6	12.2	9.4	17.9	9.6	8.3	15.8	10.0	5.8
1967	21.1	10.8	10.3	17.6	9.6	8.0	15.4	10.1	5.3
1968	21.0	11.4	9.6	17.6	9.9	7.7	14.3	10.4	3.9
1969	21.5	11.5	10.0	17.6	10.1	7.5	13.5	10.5	3.0
1970	21.8	11.4	10.4	16.6	10.0	6.6	13.7	9.9	3.8
1971	22.7	10.7	12.0	16.8	10.0	6.8	14.1	10.2	3.9
1972	22.4	11.2	11.2	16.3	10.0	6.3	13.8	10.4	3.4
1973	22.5	11.0	12.5	15.5	10.1	5.4	13.3	10.5	2.8
1974	22.3	11.2	11.1	14.9	9.9	5.0	13.4	10.6	2.8
1975	...	...	...	14.0	9.9	4.1	12.6	10.7	1.9

Year	Birth rate	Death rate	Rate of natural increase	Birth rate	Death rate	Rate of natural increase	Birth rate	Death rate	Rate of natural increase
	United Kingdom [a]			Denmark			Finland		
1960	17.5	11.5	6.0	16.6	9.5	7.1	18.5	9.0	9.5
1961	17.8	12.0	5.8	16.6	9.4	7.2	18.4	9.1	9.3
1962	18.3	11.9	6.4	16.7	9.8	6.9	18.1	9.5	8.6
1963	18.4	12.2	6.2	17.6	9.8	7.8	18.1	9.2	8.9
1964	18.8	11.3	7.5	17.7	9.9	7.8	17.6	9.3	8.3
1965	18.3	11.5	6.8	18.0	10.1	7.9	16.9	9.6	7.3
1966	17.9	11.8	6.1	18.4	10.3	8.1	17.0	9.4	7.6
1967	17.5	11.3	6.2	16.8	9.9	6.9	16.8	9.4	7.4
1968	17.2	11.9	5.3	15.3	9.7	5.6	15.9	9.7	6.2
1969	16.7	12.0	4.7	14.6	9.8	4.8	14.6	9.9	4.7
1970	16.3	11.8	4.5	14.4	9.8	4.6	14.0	9.6	4.4
1971	16.2	11.6	4.6	15.2	9.8	5.4	13.2	9.9	3.3
1972	14.9	12.1	2.8	15.1	10.1	5.0	12.8	9.6	3.2
1973	13.9	12.0	1.9	14.3	10.1	4.2	12.2	9.3	2.9
1974	13.2	11.9	1.8	14.2	10.2	4.0	13.3	9.6	3.7
1975	12.4	11.9	0.5	...	...	...	14.1	9.3	4.8

than is currently occurring in Western and Northern Europe and in the German Democratic Republic.

Bulgaria, Czechoslovakia, Hungary, Poland and the Soviet Union are special cases, because of the rise in natality recently observed in those countries. What view should be taken of this has been indicated above, and they too may be expected to experience the same development as the other countries.

Natality curve II after the year 2000

For the year 2000, curve II is at almost the same level for all the countries (between 10 and 11 per 1,000), and, in fact, is also at the same level as the regions under theoretical projection II. It can thus perhaps be agreed that between 2000 and 2030, the same movement will occur everywhere, and that the crude birth rate for the period 2025–2030 will be 8.5 per

TABLE 5 (continued)

Southern Europe

Year	Portugal [a] Birth rate	Death rate	Rate of natural increase	Albania Birth rate	Death rate	Rate of natural increase	Greece Birth rate	Death rate	Rate of natural increase
1960	24.2	10.8	13.4	43.4	10.4	33.0	18.9	7.3	11.6
1961	24.5	11.2	13.3	41.2	9.3	31.9	17.9	7.6	10.3
1962	24.5	10.8	13.9	39.3	10.7	28.6	18.0	7.9	10.1
1963	23.5	10.8	12.7	39.1	10.0	29.1	17.5	7.9	9.6
1964	23.8	10.6	13.2	37.8	8.7	29.1	18.0	8.2	9.8
1965	22.9	10.3	12.6	35.2	9.0	26.2	17.7	7.9	9.8
1966	22.2	10.8	11.4	34.0	8.6	25.4	17.9	7.9	10.0
1967	21.5	10.2	11.3	35.3	8.4	26.9	18.7	8.3	10.4
1968	20.6	10.0	10.6	35.6	8.0	27.6	18.3	8.4	9.9
1969	19.8	10.6	9.2	35.3	7.5	27.8	17.6	8.2	9.4
1970	20.0	10.8	9.2	32.6	9.3	23.3	16.5	8.4	8.1
1971	22.1	11.4	10.7	33.3	8.1	25.2	16.0	8.4	7.6
1972	20.3	10.5	9.8	...	...	...	15.9	8.7	7.2
1973	20.1	11.1	9.0	...	...	...	15.3	8.7	6.7
1974	19.3	11.1	8.2	...	...	...	16.1	8.5	7.6
1975	...	...	...	...	...	...	15.6	8.9	6.7

Year	Italy Birth rate	Death rate	Rate of natural increase	Spain Birth rate	Death rate	Rate of natural increase	Yugoslavia Birth rate	Death rate	Rate of natural increase
1960	18.3	9.7	8.6	21.8	8.8	13.0	23.5	9.9	13.6
1961	18.6	9.4	9.2	21.3	8.6	12.7	22.7	9.0	13.7
1962	18.7	10.1	8.6	21.2	9.0	12.2	21.9	9.9	12.0
1963	19.0	10.2	8.8	21.4	9.1	12.3	21.4	8.9	12.5
1964	19.9	9.6	10.3	22.0	8.7	13.3	20.8	9.4	11.4
1965	19.2	10.0	9.2	21.1	8.6	12.5	20.9	8.7	12.2
1966	18.9	9.6	9.3	20.7	8.6	12.1	20.4	8.1	12.3
1967	18.1	9.7	8.4	20.8	8.7	12.1	19.6	8.7	10.9
1968	17.6	10.1	7.5	20.2	8.6	11.6	19.1	8.7	10.4
1969	17.5	10.1	7.4	20.0	9.1	10.9	18.9	9.3	9.6
1970	16.8	9.7	7.1	19.6	8.3	11.3	17.8	8.9	8.9
1971	16.8	9.7	7.1	19.7	8.9	10.8	18.3	8.7	9.6
1972	16.3	9.6	6.7	19.5	8.2	11.3	18.3	9.1	9.2
1973	16.0	9.9	6.1	19.3	8.5	10.8	18.0	8.7	9.3
1974	15.7	9.5	6.2	19.3	8.5	10.9	17.9	8.5	9.4
1975	15.3	10.4	4.9	18.2 [b]	8.1 [b]	10.1 [b]	18.1	8.6	9.5

SOURCE: For 1975, figures for Bulgaria, Romania, Federal Republic of Germany (death and natural increase rates only), Luxembourg, USSR, Norway, Greece, Spain and Yugoslavia taken from United Nations data.

[a] Within the respective regions, countries with relatively high recent crude death rates. This does not mean that these countries have a higher mortality than the others in their respective regions; it is due to differences in age structure, the former group of countries have higher proportions of old people than the latter. If the decline in fertility continues, it is likely that the countries with relatively high crude death rates will have more deaths than births by 2000. The others should not experience such a development until after 2000.

[b] Excluding Ceuta and Melilla.

TABLE 6. OBSERVED BIRTHS IN EASTERN EUROPE, BY COUNTRY, 1966–1974

Year	Romania	Czechoslovakia	Hungary	Poland	Bulgaria	German Democratic Republic
1966	273,678	222,615	138,489	530,307	123,039	267,958
1967	527,764	215,985	148,886	520,383	124,582	252,817
1968	526,091	213,807	154,419	524,174	141,460	245,143
1969	465,764	228,934	154,318	531,135	143,060	238,910
1970	427,034	228,531	151,819	545,973	138,745	236,929
1971	400,146	237,110	150,640	562,341	135,422	234,952
1972	389,153	251,238	153,265	575,725	131,316	200,443
1973	378,696	274,461	156,100 [a]	598,600	140,100	180,336
1974	...	294,000 [a]	186,000 [a]	618,100 [a]	...	177,600 [a]

[a] Provisional figure.

TABLE 7. COMPUTATION OF THE CRUDE BIRTH RATE WHICH WOULD BE OBSERVED IN THE UNITED KINGDOM IF THE GROSS REPRODUCTION RATE STABILIZED AT 0.750 IN THE PERIOD 1985-2000

	"Most likely" projection		Theoretical projection II	
Period (1)	Gross reproduction rate (2)	Crude birth rate (per 1,000) (3)	Gross reproduction rate (4)	Crude birth rate (per 1,000) [a] (5)
1985-1990......	1.140	16.7	0.750	11.0
1990-1995......	1.130	16.5	0.750	11.0
1995-2000......	1.130	16.1	0.750	10.7

[a] The rates in column (5) are obtained by dividing the figures in column (4) by those in column (2) and multiplying the result by the figure in column (3): $\dfrac{\text{column (4)} \times \text{column (3)}}{\text{column (2)}}$.

1,000. Curve II has been extended accordingly for all the countries.

The mortality curve

Next to be considered is the curve representing crude death rates. It comprises three parts; (a), (b) and (c). Part (a) represents the crude death rates observed since 1960. Part (b) represents crude death rates under the "most likely" projections. In most cases, part (b) follows the same trend as part (a). It may be noted in passing that this trend is upward, owing to the fact that the population is aging. It did not appear necessary to compute crude death rates corresponding, for each country, to movements that would occur according to the assumptions of theoretical projections I and II. The crude death rate is much less affected by these assumptions than the crude birth rate, and the result would have been curves close to each other, and also to curve (b). Since the assumptions of theoretical projection II generally involve more aging than the "most likely" projection,[8] it can be said that, according to that pro-

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[8] Except for Finland, where the "most likely" projection is practically identical with theoretical projection II.

jection, countries would have slightly higher crude death rates than those of curve (b), but that until 2000 the difference would be small. It is especially after 2000 that the impact of aging is discernible. Theoretical projection II, as computed for the regions, shows a considerable increase in the crude death rate between 2000 and 2030. At the point where the prospect ends, in the year 2030, all the regions are at substantially the same level (from 15 per 1,000 to 16.3 per 1,000).

For the period 2025-2030, the level of the region to which each country belongs was assigned to the country and curve (b) was joined to that level. This procedure produced curve (c), thereby completing the mortality curve which would result if countries conformed to the assumptions of theoretical projection II regarding fertility and mortality. Lastly, by comparing the curves marked "Mortality" and "Natality" in figure I, the results for each country of the assumptions of theoretical projection II regarding population change may be seen.

Conclusions

This exercise may be concluded by comparing recent changes in mortality and natality with the various "projections". Fertility in Western and Northern Europe is very clearly moving towards theoretical projection II and is not very far from it. Fertility in Southern Europe is following the same course but is still far from theoretical projection II; and a change of direction, although unlikely, cannot be ruled out. In Eastern Europe (excluding the German Democratic Republic, which is following the trend in the Federal Republic of Germany) and in the Soviet Union, the recent rise in natality appears similar to that observed in Romania in 1967. If so, it will presumably be temporary, and the decline towards the level of theoretical projection II will soon resume. Ultimately, therefore, it appears that projection II best describes the fertility trend in Europe

TABLE 8. ESTIMATED CRUDE BIRTH RATES UNDER THEORETICAL PROJECTION II ON THE BASIS OF THE CRUDE BIRTH RATES UNDER THEORETICAL PROJECTION I AND COMPARISON OF THE ESTIMATES WITH THE REAL RATES, REGIONS OF EUROPE AND UNION OF SOVIET SOCIALIST REPUBLICS, 1995-2000 AND 2025-2030

		Theoretical projection I		Theoretical projection II		
Region or country (1)	Period (2)	Gross reproduction rate (3)	Crude birth rate (per 1,000) (4)	Gross reproduction rate (5)	Estimated crude birth rate [a] (per 1,000) (6)	Real crude birth rate (per 1,000) (7)
Eastern Europe........	1995-2000	1.000	14.1	0.750	10.6	10.9
	2025-2030	1.000	13.1	0.750	9.8	8.4
Northern Europe.......	1995-2000	1.000	14.0	0.750	10.5	10.8
	2025-2030	1.000	13.0	0.750	9.8	8.4
Western Europe........	1995-2000	1.000	13.9	0.750	10.4	10.6
	2025-2030	1.000	13.1	0.750	9.8	8.5
Southern Europe.......	1995-2000	1.000	14.3	0.750	10.7	11.3
	2025-2030	1.000	12.7	0.750	9.5	8.4
USSR...............	1995-2000	1.000	14.6	0.750	11.0	11.3
	2025-2030	1.000	13.2	0.750	9.9	8.7

[a] The estimated crude birth rate per 1,000 $= \dfrac{\text{column (5)} \times \text{column (4)}}{\text{column (3)}}$.

Figure I. Development of mortality and natality, Europe, 1960-2030
(Growth rates in percentage)

Austria

Belgium

France

Germany, Federal Republic of
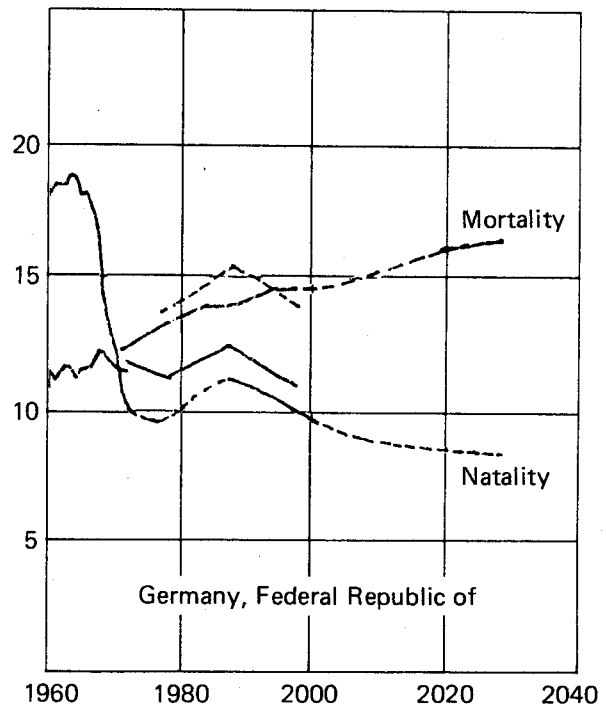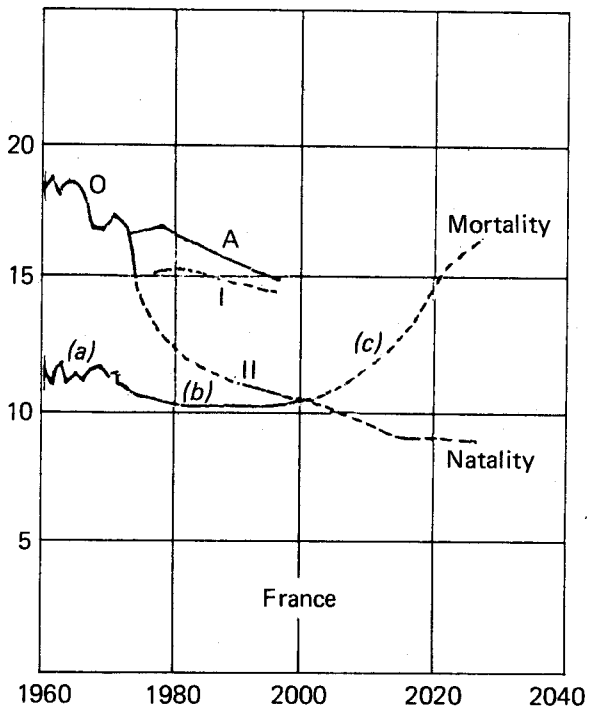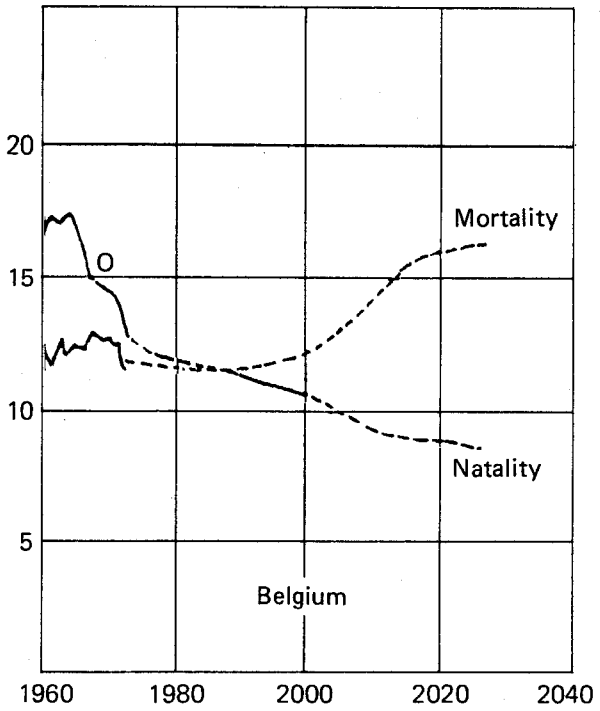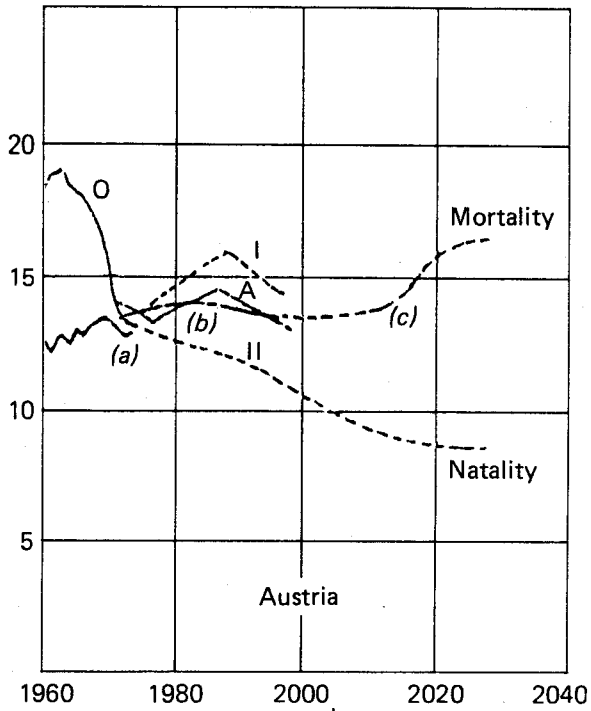
Curve O   Observed crude birth rates

Curve A   Crude birth rates under
          "most likely" projections

Curve I   Theoretical projection I

Curve II   Theoretical projection II

Curve *(a)*   Crude death rates observed in 1960

Curve *(b)*   Crude death rates under
              "most likely" projections

Curve *(c)*   Mortality curve under theoretical projection II

Figure I (*continued*)

Netherlands

Switzerland

Denmark

Finland
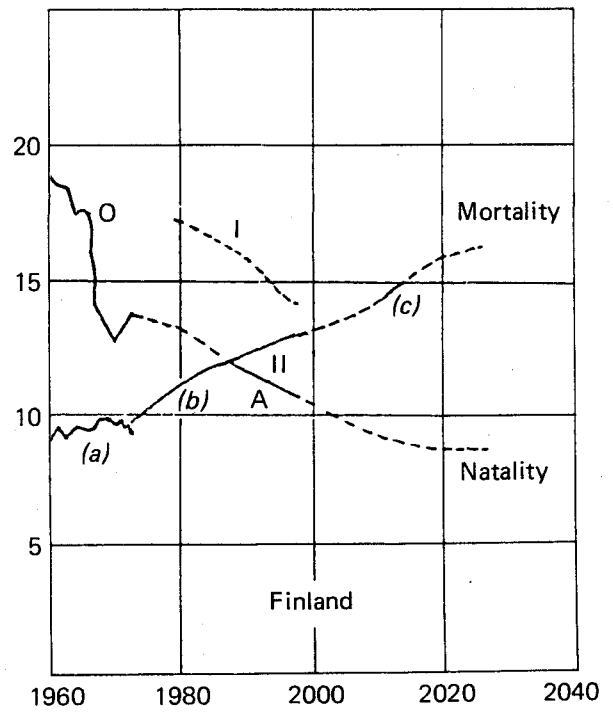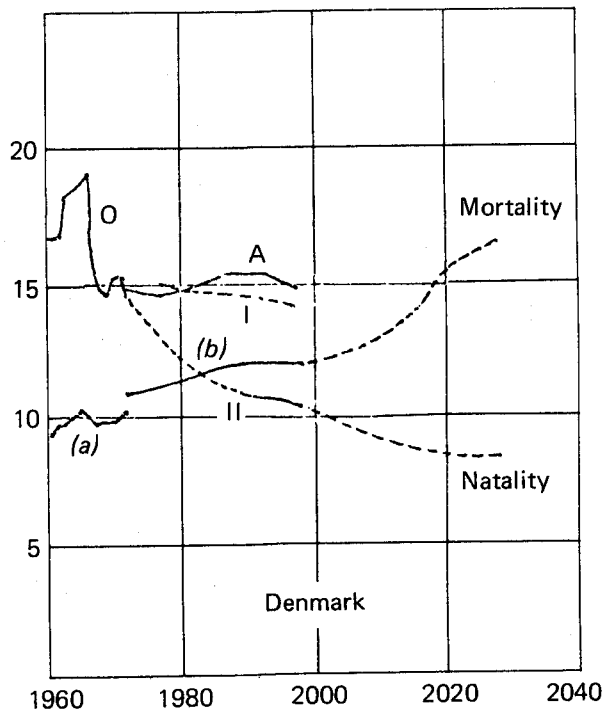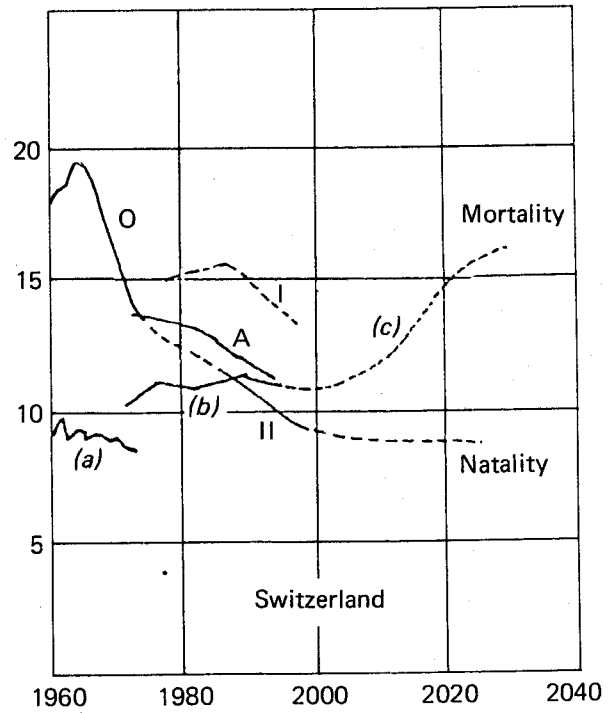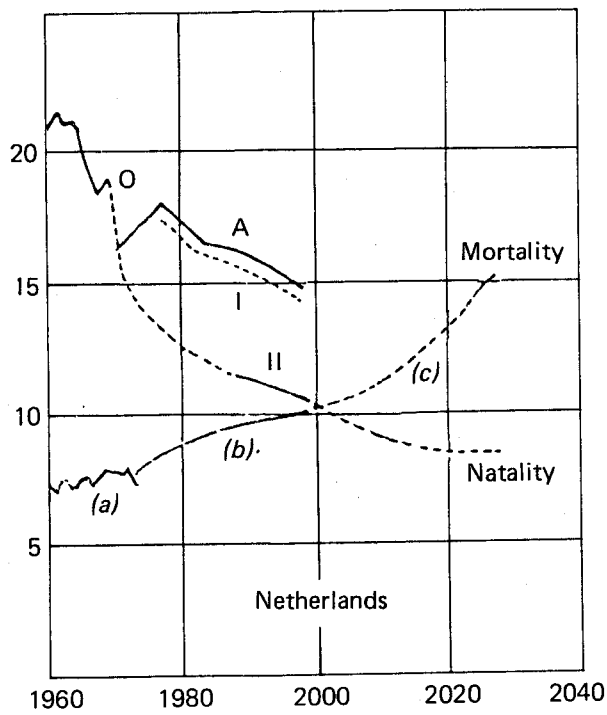
Figure I *(continued)*

Figure I (continued)

Hungary

Poland

Romania

Bulgaria

47

Figure I *(continued)*

Yugoslavia

USSR

Czechoslovakia

German Democratic Republic

Figure I *(continued)*

Ireland

Norway

Sweden

United Kingdom

49
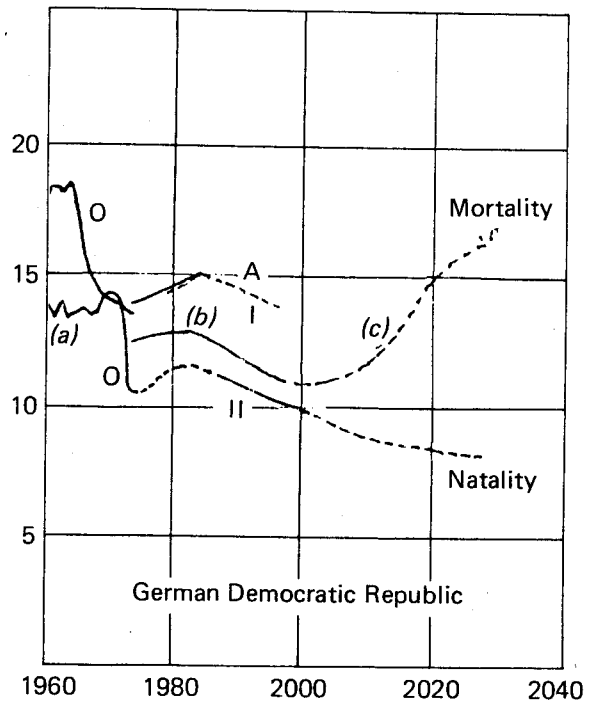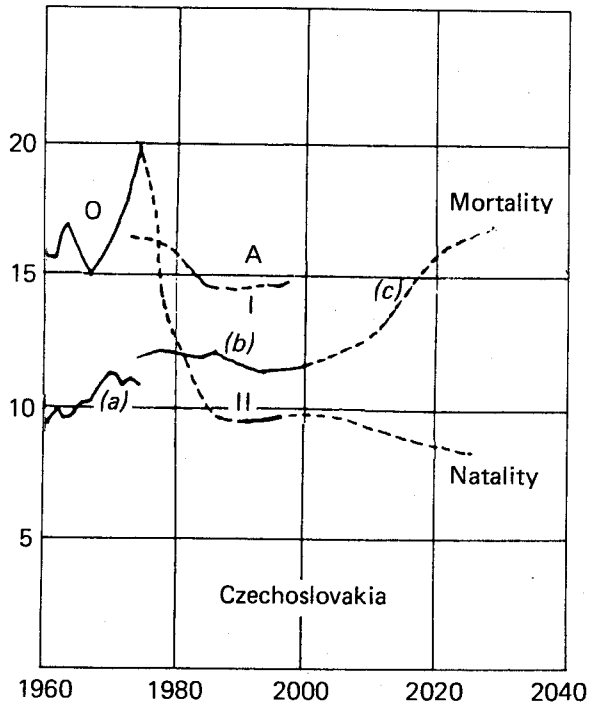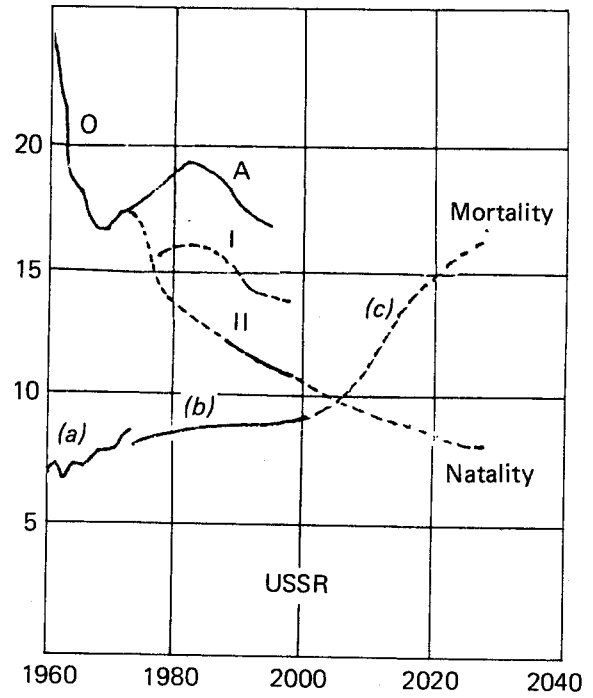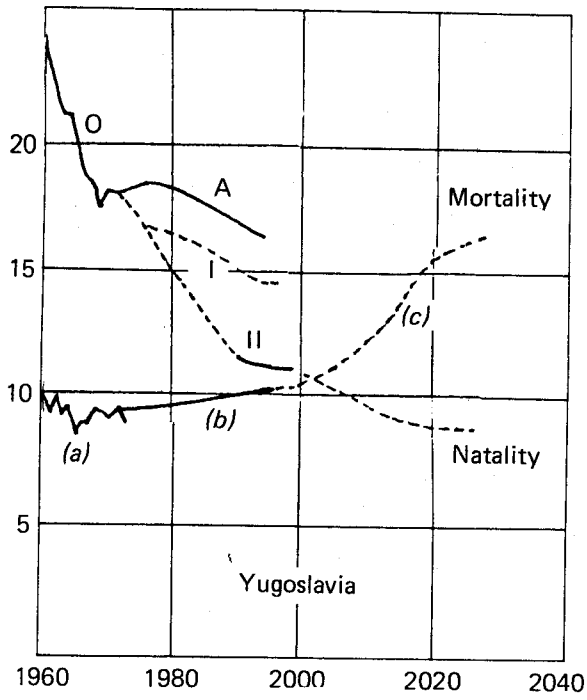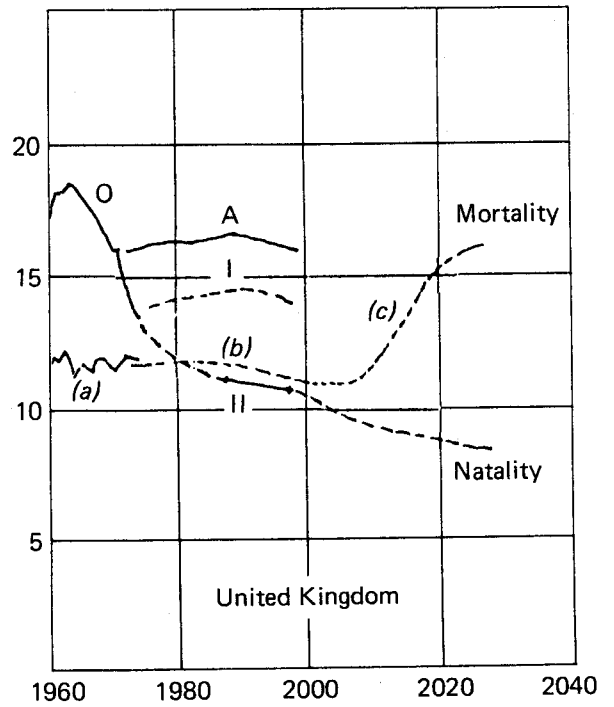
at the beginning of the last quarter of the twentieth century.

In the case of mortality, neither the "most likely" projections nor theoretical projections I and II envisage any significant movement.[9] Although such an assumption appears valid in the short term, it is open to question over the long term. The theoretical projections cover the period up to the year 2030. It would be most disappointing for mankind if the efforts to reduce mortality were to make no progress during the next 60 years. It is true that it is difficult to make predictions in such a field, as there are no precedents to guide the demographer. The stakes are worth the effort, and research should be undertaken in collaboration with all those who are endeavouring to penetrate the mysteries of the aging of living tissue.
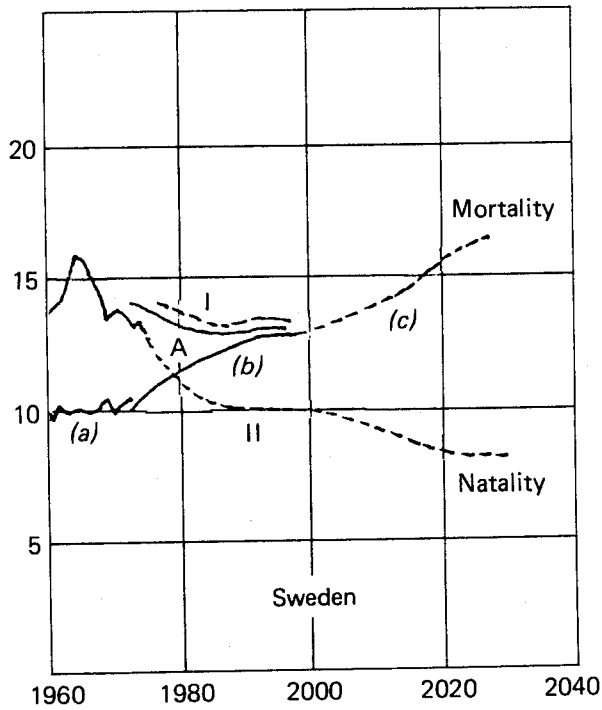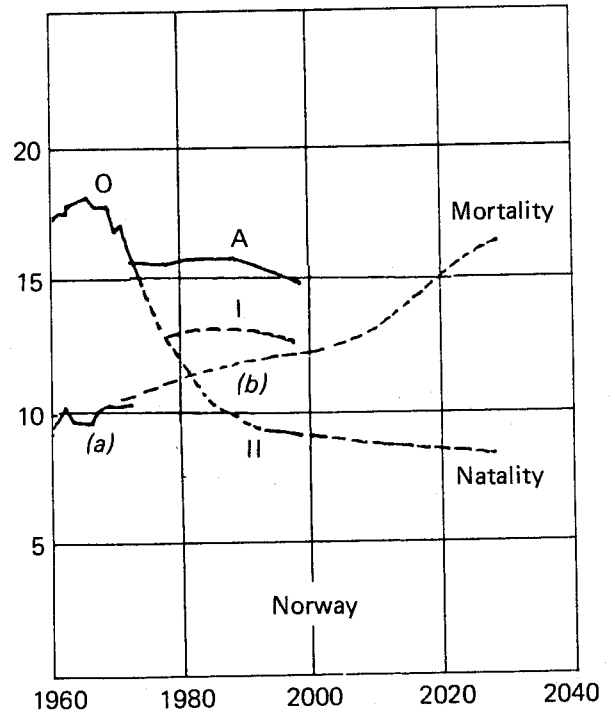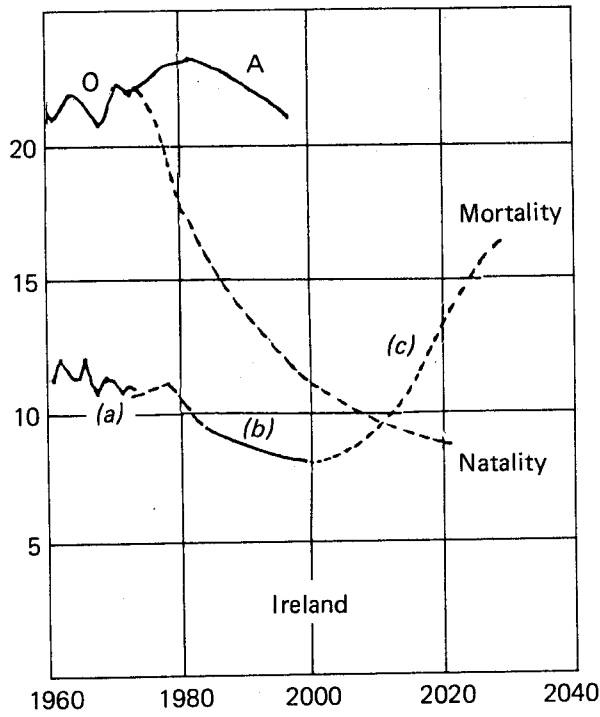
Emergence of an excess of deaths over births

The materialization of theoretical projection II obviously leads to the emergence, sooner or later, of an excess of deaths over births. Figure I gives an idea, for each country, of the date when such an excess might appear. These dates are shown in table 9.

It should be noted that the excess of deaths over births will remain small until 2000 (except in the German Democratic Republic and the Federal Republic of Germany, which are in the forefront as far as this development is concerned.[10] Even a little progress in the efforts to reduce mortality could easily delay the emergence of an excess of deaths until after 2000.[11] An influx of immigrants who could rejuvenate the population might even suffice. After 2000, however, the excess of deaths is likely to become very substantial; and an excess of deaths over births is the indicator to which public opinion is sensitive. This means that there is little prospect of public reaction before 2000. After that year, on the other hand, there is every reason to anticipate a general reaction by society to increase natality in order to prevent a reduction of the population. But it also is known that a decline in population cannot be rectified instantly. The downward movement continues even after it has potentially ceased.

Longitudinal analysis and transversal analysis

All the foregoing analyses, whether the "most likely" projections or theoretical projections I and II, are based on current data.[12]

[9] A few exceptions should be noted. France and Poland envisage a substantial decrease in excess male mortality, but the Netherlands and Portugal assume that it will increase.

[10] Also, perhaps, in Czechoslovakia and Hungary, if those countries were to move towards theoretical projection II (as mentioned earlier, some other countries "reached" that projection).

[11] France does not expect an excess of deaths until about 2000, precisely because the "most likely" projection envisages a substantial decline in male mortality. If that decline failed to materialize, an excess of deaths might be observed much earlier, for example, by about 1990 or even 1980.

[12] Excluding the "most likely" projection for France, in which fertility is defined in terms of average number of children per married woman (marriages of completed fertility).

TABLE 9. DATE AT WHICH DEATHS EXCEEDED OR MIGHT EXCEED BIRTHS, SELECTED COUNTRIES

Country	Date
German Democratic Republic	1969
Germany, Federal Republic of	1972
Luxembourg	1974
Austria	1976
Belgium, Denmark, Czechoslovakia, Hungary, Norway, Sweden, United Kingdom	About 1980
Bulgaria, Finland, Greece, Italy, Switzerland	About 1990
France, Netherlands	About 2000
Ireland, Poland, Portugal, Romania, Spain, USSR, Yugoslavia	After 2000

Current data for successive years of observation are, in fact, "stratified" by generation. It is as if each generation—that is, all women born in a given year—planned to give birth to a certain number of children during their reproductive period, and the average number of children per woman of that generation summed up, as it were, the generation's reproductive behaviour. But such a plan can, of course, be carried out in various ways, and the timing of successive births during the reproductive period can vary according to circumstances. The age-specific female fertility rates observed at a given time are therefore determined by two categories of factors: first, basic factors related to a society's view of the family; and secondly, circumstantial factors related to the current situation.

When one considers all age-specific female fertility rates for a given year and totals them in order to calculate the average number of children per woman (or, if one counts only girls, the current gross reproduction rate), one is, in fact, totalling the "behaviours" of a set of generations, each of which usually has a plan different from that of the others. If successive generations did not change the time-table for carrying out their plans, there would be a very simple relation between the current average number of children per woman and the average number per generation; if $\bar{a}$ equals the average age of the generation time-table (age assumed to be invariable), the current index for calendar year N would be practially equal to the index for generation $N - \bar{a}$ (i.e., the index for women born in the year $N - \bar{a}$). Unfortunately, successive generations have different time-tables and the above-mentioned relation is not verified, as can be seen clearly from figure II, which relates to France. The figure shows two curves:

Figure II. Completed generation fertility and total fertility rate with a 28-year shift, France, 1860-1980
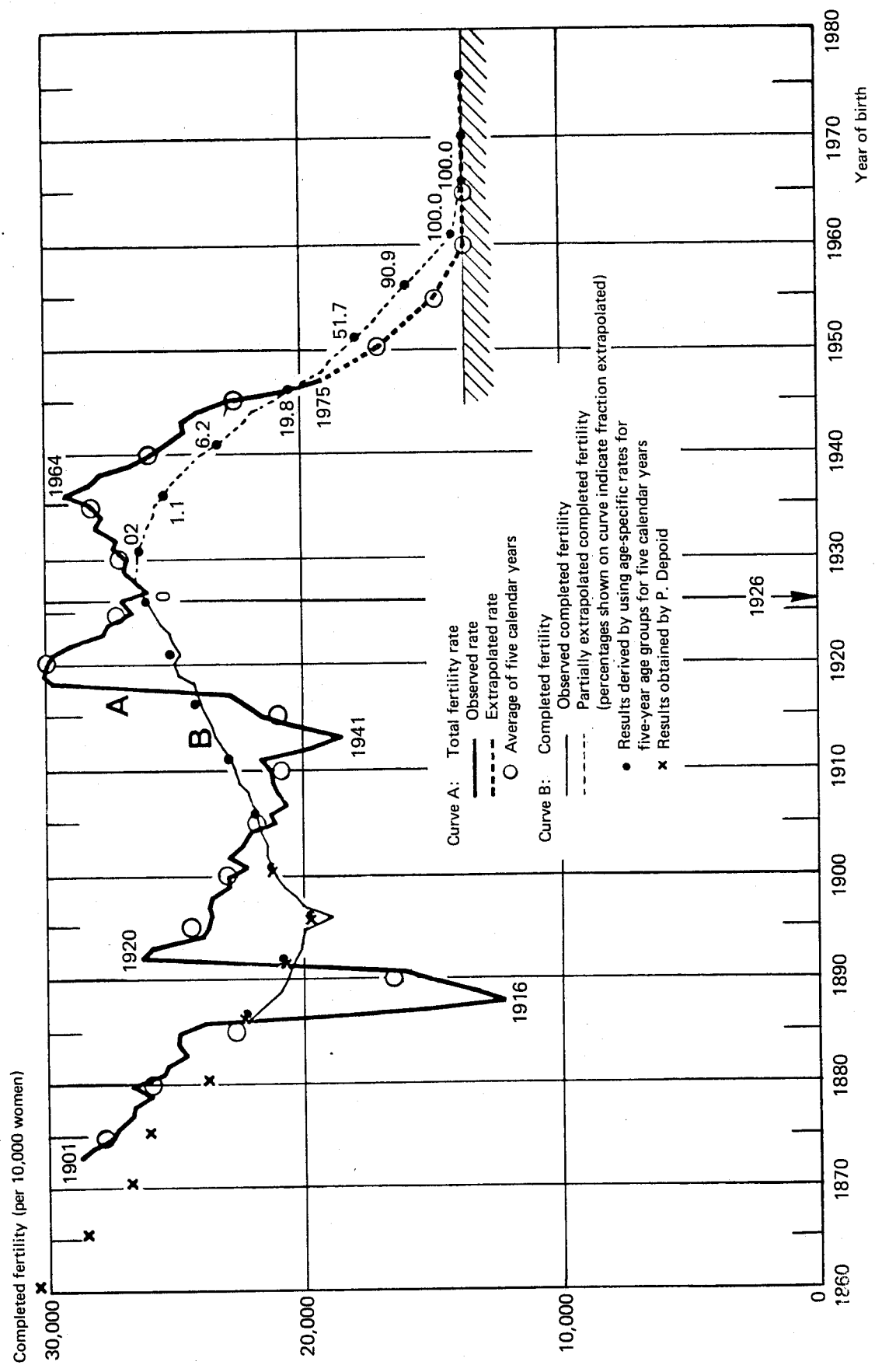
SOURCE: For results marked "X", P. Depoid, *Reproduction nette en Europe depuis l'origine des statistiques de l'état civile*, étude démographique No. 1 (Paris, Statistique générale de la France, 1941).

Note: Hatched area marks the stabilization level of the Federal Republic of Germany.

51

one (A) represents the current average number of children per woman; the other (B), the average number of children per woman per generation. If generations had not changed their time-table over the years, the two curves should be practically the same. However, this is far from being the case; and the distances between the two curves reflect, as it were, variations in timing.

These variations in timing make it very difficult to determine the significance of current indexes. One may legitimately question the validity of a "prospect" based on analysis of current data. In a projection that assumes a stabilization of fertility, current indexes and generation indexes eventually become identical. When the stabilization level is determined on the basis of current indexes, as is the case in the projections under consideration, the procedure therefore amounts to attributing to generations a current behaviour—in other words, a behaviour that may be influenced by current factors and may not correspond to the basic behaviour of generations, which alone is of importance for the future.

The foregoing analysis of current indexes shows those indexes to be leading towards a fertility level characterized by a gross reproduction rate of 0.750, or slightly more than 1.5 children per woman. The question is whether that is a possible behaviour for any generation.

Let it be said at once that no generation so far has achieved that level. The lowest observed generation fertility has never fallen below 1.8 children (generation of 1907 in England and Wales). A generation fertility of 1.5 children would therefore be a new development of capital importance. Of course, there has never before been a time when contraception was practised to perfection. It is only now that mankind's ancient dream of really being able to have only wanted children can be made a reality. Modern contraceptive techniques and the availability of legal abortions are for the first time giving women the means to choose the size of their family. The emergence of a new phenomenon, such as an average generation fertility of 1.5 children, would therefore not be surprising after all.

Figure II and similar figures constructed for other countries in Western and Northern Europe do appear to confirm the possibility of generation fertility as low as this level. These graphs should, however, be interpreted with caution, and the best way of ensuring that they shall be understood properly is to give some details as to how figure II was derived.

It was based on data extending up to 1975. If it is assumed that the number of births to women over the age of 49 is negligible, the oldest cohort having completed its fertility in 1975 is that which reached the age of 49 in 1975, that is, the cohort born in 1926. Strictly speaking, therefore, one would have to wait for some years before knowing the fertility of cohorts born after 1926, since they have as yet completed only a fraction of their lifetime fertility—and a fraction which grows smaller the further removed the cohort is from 1926. The fertility of cohorts born shortly after 1926 is almost completed and the missing fraction can be esti-

mated. The difficulty lies in knowing how far one can go in that type of estimate and what is the best method to use.

Figure III (*a-c*) illustrates the principle of such a method. Generation fertility has been cumulated from the lower end; that is, completed fertility over a specific age has been estimated; and completed fertility over the ages of 45, 40, 35, 30, 25, 20 and 15 is shown in the figure.

The starting-point is the completed fertility of those over 45 (figure III(*a*)), which is known up to the 1926 cohort. The curve is extended up to 1931. The completed fertility for over 40 years is then "known" up to the 1931 cohort. The curve of the fertility of that age group is extended up to 1936. The completed fertility for over 35 years is then "known" up to the 1936 cohort. The process is repeated, beginning with the completed fertility over 35 years, 30 years etc. The extrapolated part of the curves is drawn as a dotted line in figure III (*a-c*). That part of the curve which becomes "known" through the dotted-line extrapolations is draw as a fine line. That part of the curve which is really known is drawn as a heavy line; it ends with the 1926 cohort.

The dotted-line portions are pure extrapolations. The fine lines are the result of a combination of pure extrapolation and known results. The proportion of pure extrapolation in the combination increases as younger ages are considered and here the question previously raised comes up again: how far can one go? [13]

Given the fact that the trend in over-35 fertility is steady—in fact, a continuous, steady decline (figure III(*b*)—the method can probably be taken to be valid up to that age. A good estimate for cohorts born prior to 1942 can then be considered to be available. But that leaves unused a wealth of available data regarding fertility, namely, all the data on cohorts born after 1941, that is to say, the cohorts which are now at the height of their childbearing.

It was stated earlier that there was a very simple relationship between current total fertility rates [14] and completed generation fertility when the timing of family-building remained constant from one generation to the next. The current curve, transposed to the average of the ages covered by the time-table, then coincides roughly with the curve of generation fertility. It has also been shown, however, that in the case of France, the timing varies and the two curves do not coincide.[15] The deduction about the relationship between completed fertility and the total fertility rate may be applied to cumulative fertility over a specified age.

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[13] In fact, the method is applied by year of age, not for five-year age groups as stated in the figure. On each curve, therefore, it is enough to extrapolate a single year. However, that in no way alters the principle of the method and the question remains.

[14] One should recall that the current total fertility rate is equal to the sum of the female fertility rates (if one uses the fertility rates per five-year age group, the index is equal to five times the sum of the five-year rates).

[15] France is taken here as an example, but the phenomenon occurs in the other countries.

Figure III. Completed generation fertility, France

Completed fertility (per 10,000 women)
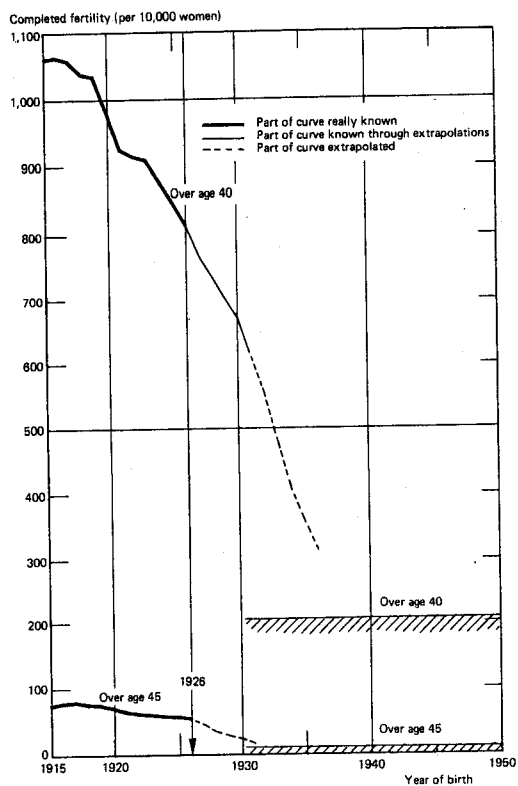
(a) Completed generation fertility, groups over ages 44 and 39

Completed fertility (per 10,000 women)

(b) Completed generation fertility, groups over ages 39 and 34

Completed fertility (per 10,000 women)

(c) Completed generation fertility, groups over ages 34, 29, 24, 19 and 14; and total fertility rate at the same ages (dotted line) transposed 39 years (35 and over), 35 years (30 and over) and 31 years (25 and over)

Note: Hatched areas mark the stabilization levels of the Federal Republic of Germany.

53

Figure IV. Completed generation fertility over ages 24 and 29; and total fertility rates over ages 24 and 29 transposed, respectively, 31 and 35 years, France, 1860-1970
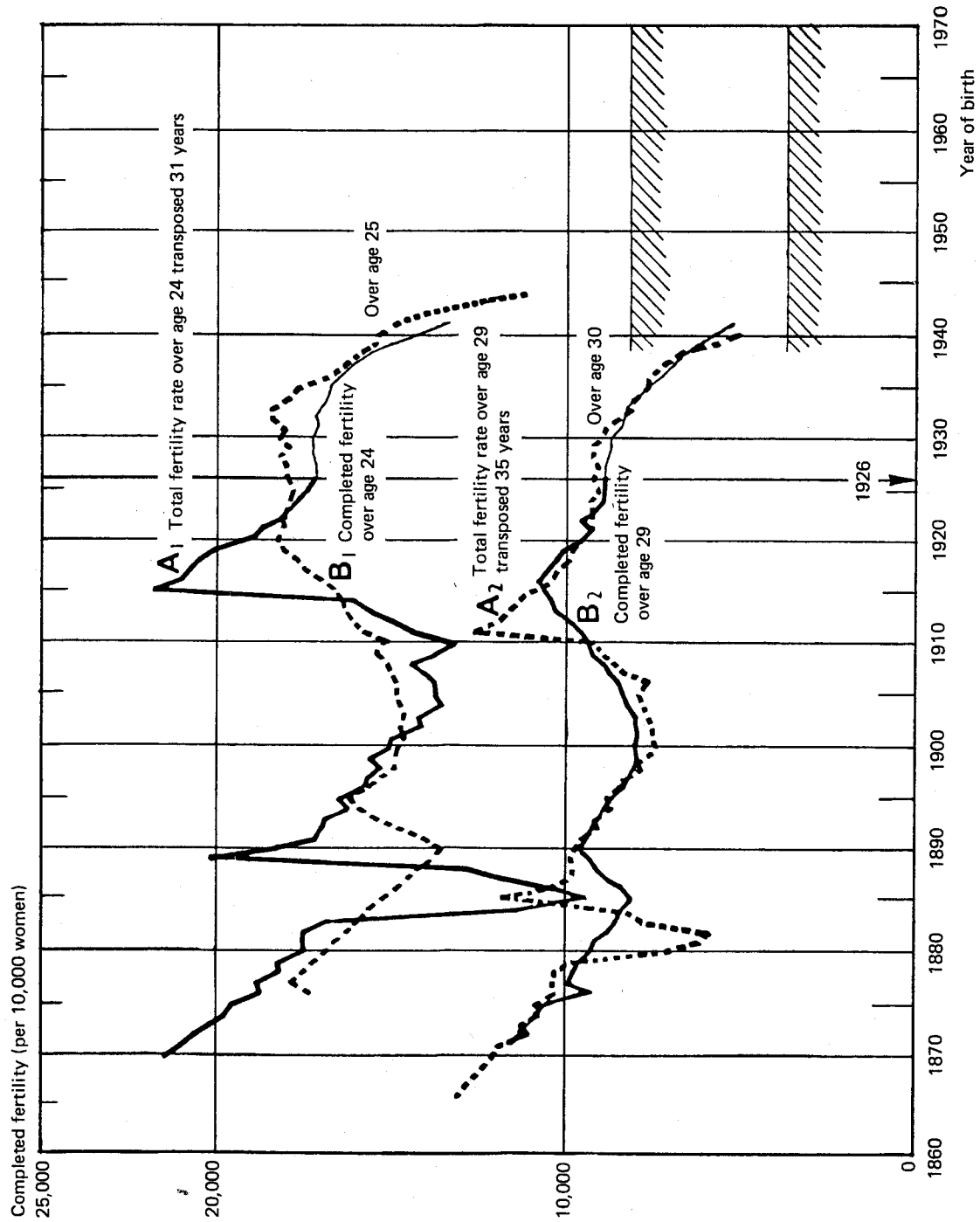
Note: Hatched areas mark the stabilization levels of the Federal Republic of Germany.

54

Only the amount of shift will vary. The study of the distribution of births by age of the mother suggests that the following shifts might be used:

Over 15 years: shift of 28 years;
Over 20 years: shift of 28 years;
Over 25 years: shift of 31 years;
Over 30 years: shift of 35 years;
Over 35 years: shift of 39 years;
Over 40 years: shift of 43 years.

The current data for France are shown in figures III(c) and IV with these shifts; aside from the periods affected by war, the effects of timing variations visibly diminish as higher age brackets are considered. The previous estimates are entirely confirmed. This new presentation, however, does not extend beyond the 1941 cohort. The very most that can be said is that the observed decline in completed fertility which began with the 1928 cohort will continue, at least until the 1944 cohort and probably beyond, but it is difficult to say at what level.

The decline in completed fertility is not peculiar to France; it has been observed in all the countries in Western and Northern Europe. Two countries are leading the movement: the German Democratic Republic and the Federal Republic of Germany. It may well be that they foreshadow the path which other countries will follow and that they can accordingly provide enlightenment about it. Current data indicate that the very sharp decline recorded until 1973 became less marked in 1974 and 1975. Figure V, which shows the trend of the total fertility rate in the German Democratic Republic and the Federal Republic of Germany, demonstrates this clearly. Up to 1973, the data are known. For 1974 and 1975, only the absolute number of births is known.[16] The age-specific fertility rates for 1973 are applied to the age structure for these two years to derive the number of births there would have been in 1974 and 1975 if fertility had remained constant at the 1973 level. The ratio of observed births to es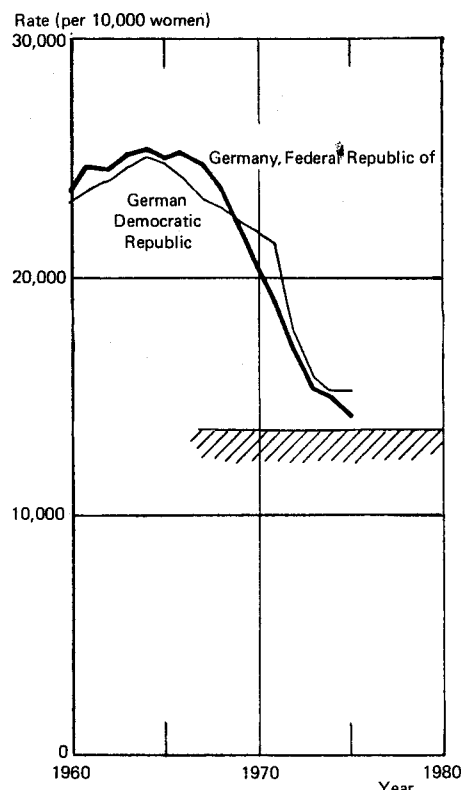timated births gives an estimated coefficient for the decline in the total fertility rate. The procedure is fairly reliable, and it is therefore certain that the pace of decline has slackened. Figure V suggests that the total fertility rate will level off at around 1,400 (per 1,000 women). However, although there is no doubt about the over-all decline, the way in which it is distributed among the ages is unknown.

Table 10 gives the trend in fertility rates by age group for the Federal Republic of Germany and the German Democratic Republic, and the average age of mothers at the time of their children's birth.

Figure VI illustrates this table. A new fact emerges: although the general trend has been very similar in the German Democratic Republic and the Federal Republic of Germany, the trend in the age-specific rates differs. Fertility appears to begin at earlier ages in the German Democratic Republic than in the Federal Republic of

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16 The figure for 1975 is estimated.

Germany, and this feature seems to have existed always. It may therefore be assumed that it will still exist in the future. The age-specific stabilization levels will therefore not be the same in the two countries. Figure VI suggests the levels shown at the bottom of table 10. These would also appear to be the "limits" towards which the rates in other European countries are headed. Table 11 shows at what points these limits occurred in the history of three other countries in Europe: France, England and Wales, and the Netherlands. Above age 20, the "limits" observed for the Federal Republic of Germany are well in line with the perceived trend and can probably be accepted for these three countries also. For the age group 15–19 years, there continues to be variation among countries, and it is difficult to select a common limit; that aspect, however, in no way affects the passages which follow.

To apply the limits of the Federal Republic of Germany to France for the ages 20 and over, one can again take up figure III(c) and make free-hand extrapolations of the curves on the basis of these limits. The last cohort for which an estimate of completed fertility was available was the 1941 cohort. The curve for 30 years and over (figure VII) is then extended in the direction of the limit of the Federal Republic of Germany, up to the 1946 cohort (segment AB). Cumulative fertility for
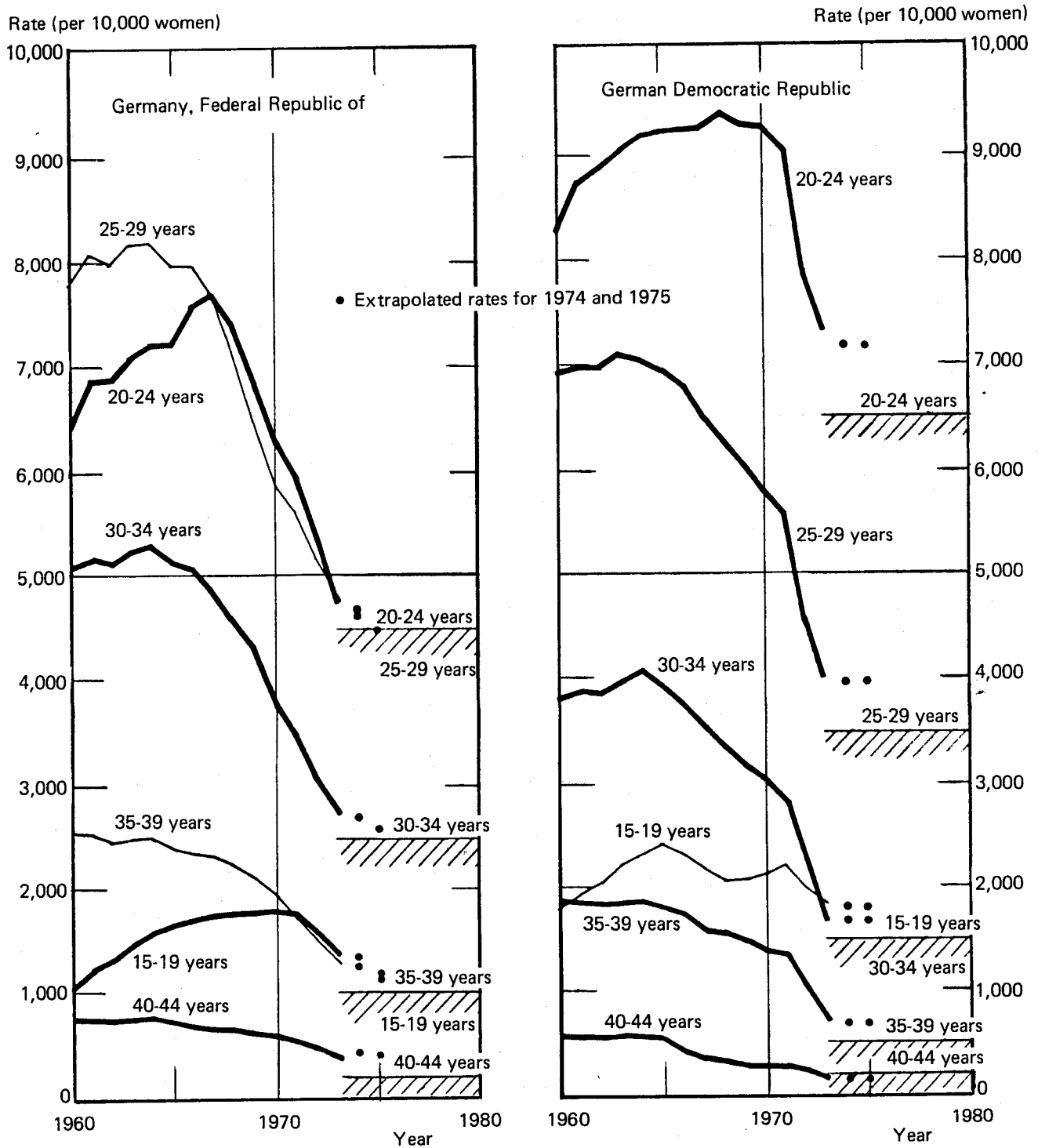
Figure V. Total fertility rate, German Democratic Republic and Federal Republic of Germany, 1960-1975

Note: Hatched area marks the proposed stabilization level.

55

TABLE 10. AGE-SPECIFIC FEMALE FERTILITY,[a] TOTAL FERTILITY RATE AND MEAN AGE OF MOTHERS AT TIME OF BIRTH OF CHILDREN, FEDERAL REPUBLIC OF GERMANY, 1949–1975; AND GERMAN DEMOCRATIC REPUBLIC, 1952–1975

Year	15–19 FRG	15–19 GDR	20–24 FRG	20–24 GDR	25–29 FRG	25–29 GDR	30–34 FRG	30–34 GDR	35–39 FRG	35–39 GDR	40–44 FRG	40–44 GDR	Total fertility rate (per 1,000) FRG	Total fertility rate (per 1,000) GDR	Average age of mothers (years) FRG	Average age of mothers (years) GDR
1949	829	…	5,223	…	6,570	…	4,878	…	2,913	…	975	…	2,139	…	29.1	…
1950	906	…	5,131	…	6,315	…	4,755	…	2,793	…	974	…	2,087	…	29.0	…
1951	958	…	5,323	…	6,241	…	4,560	…	2,596	…	900	…	2,058	…	28.8	…
1952	937	1,480	5,459	7,964	6,352	7,084	4,650	4,409	2,535	2,300	870	732	2,080	2,400	28.7	27.6
1953	892	1,471	5,486	8,067	6,419	6,893	4,659	4,326	2,469	2,218	831	693	2,076	2,369	28.7	27.5
1954	890	1,473	5,643	8,000	6,590	6,869	4,779	4,201	2,505	2,206	824	698	2,023	2,348	28.7	27.5
1955	863	1,549	5,626	8,027	6,694	6,858	4,809	4,170	2,479	2,141	808	670	2,128	2,344	28.7	27.4
1956	911	1,507	5,909	7,879	7,076	6,645	4,959	3,906	2,572	2,013	823	605	2,225	2,258	28.6	27.3
1957	951	1,482	6,251	7,724	7,516	6,615	5,103	3,768	2,618	1,885	815	567	2,325	2,207	28.5	27.2
1958	938	1,512	6,213	7,746	7,577	6,594	5,074	3,751	2,588	1,853	774	546	2,316	2,203	28.5	27.1
1959	1,031	1,694	6,436	8,315	7,857	7,055	5,142	3,921	2,653	1,910	790	551	2,392	2,347	28.4	27.0
1960	1,094	1,815	6,380	8,267	7,808	6,911	5,068	3,865	2,560	1,859	748	543	2,366	2,328	28.3	26.9
1961	1,234	1,956	6,817	8,702	8,044	6,973	5,117	3,906	2,554	1,870	745	535	2,451	2,396	28.2	27.0
1962	1,310	2,081	6,824	8,879	7,960	6,949	5,058	3,878	2,468	1,814	734	527	2,435	2,414	28.1	26.7
1963	1,470	2,221	7,047	9,026	8,167	7,064	5,210	3,958	2,493	1,856	743	539	2,513	2,468	28.0	26.7
1964	1,595	2,321	7,165	9,147	8,185	7,060	5,254	4,099	2,496	1,878	745	539	2,544	2,507	27.9	26.7
1965	1,641	2,409	7,189	9,203	7,975	6,930	5,094	3,946	2,409	1,809	715	509	2,502	2,483	27.8	26.5
1966	1,722	2,306	7,507	9,232	7,958	6,767	5,043	3,794	2,383	1,721	684	405	2,530	2,424	27.7	26.4
1967	1,734	2,203	7,614	9,239	7,656	6,449	4,872	3,530	2,319	1,593	653	345	2,485	2,337	27.6	26.3
1968	1,752	2,094	7,386	9,386	7,193	6,229	4,610	3,375	2,261	1,564	639	305	2,384	2,296	27.5	26.2
1969	1,787	2,102	6,782	9,294	6,494	6,027	4,301	3,177	2,134	1,473	600	270	2,210	2,235	27.5	26.0
1970	1,805	2,150	6,262	9,267	5,804	5,786	3,775	3,059	1,921	1,399	558	265	2,012	2,194	27.4	25.9
1971	1,794	2,214	5,973	9,051	5,606	5,534	3,504	2,897	1,762	1,345	535	269	1,917	2,131	27.3	25.8
1972	1,605	1,975	5,309	7,883	5,130	4,578	3,112	2,194	1,516	1,004	471	231	1,714	1,786	27.2	25.6
1973	1,369	1,826	4,726	7,284	4,781	4,063	2,791	1,716	1,319	704	418	175	1,540	1,577	27.3	25.2
Limits	1,000	1,500	4,500	6,500	4,500	3,500	2,500	1,500	1,000	500	200	200	1,371	1,371	27.0	25.2
1974[b]	1,340	1,790	4,625	7,160	4,680	3,995	2,735	1,685	1,290	695	410	170	1,508	1,549	27.3	25.2
1975[b]	1,150	1,790	4,500	7,160	4,500	3,995	2,600	1,685	1,200	695	390	170	1,434	1,549	27.3	25.3

SOURCES: For German Democratic Republic, 1960–1973, *Bevölkerungsstatistisches Jahrbuch der Deutschen Demokratischen Republik*, 1974 and 1975; p. 456, table 11; and p. 115, table 6, respectively; for 1952–1959, estimates based on rates including stillbirths, *ibid.*, 1965; p. 98, table 10. For Federal Republic of Germany, *Statistisches Jahrbuch für die Bundesrepublik Deutschland*, successive years.

[a] Sum by age groups of fertility rates by year of age (per 10,000 women).
[b] For 1974 and 1975, the rates were extrapolated in order to derive an annual number of births equal to the observed number when the rates are applied to the age-specific female population in the year in question.

Figure VI. Trend in fertility rates,[a] by five-year age groups, German Democratic Republic and Federal Republic of Germany, 1960-1980

Rate (per 10,000 women)

Rate (per 10,000 women)

Germany, Federal Republic of

German Democratic Republic

- Extrapolated rates for 1974 and 1975

25-29 years

20-24 years

20-24 years

30-34 years

20-24 years

25-29 years

25-29 years

30-34 years

35-39 years

30-34 years

30-34 years

15-19 years

35-39 years

15-19 years

15-19 years

35-39 years

40-44 years

15-19 years

40-44 years

30-34 years

40-44 years

35-39 years

40-44 years

1960   1970   1980
Year

1960   1970   1980
Year

Note: Hatched areas mark proposed stabilization levels.

[a] Sum by age group for age-specific fertility rates.

TABLE 11. FEMALE FERTILITY,[a] BY AGE GROUP, IN FRANCE, ENGLAND AND WALES, AND THE NETHERLANDS, 1943–1973, AND EXTRAPOLATION FOR 1974 AND 1975; COMPARISON WITH THE "LIMITS" FOR THE GERMAN DEMOCRATIC REPUBLIC AND THE FEDERAL REPUBLIC OF GERMANY

Age group (years)

Year	15–19 France	15–19 England and Wales	15–19 Netherlands	20–24 France	20–24 England and Wales	20–24 Netherlands	25–29 France	25–29 England and Wales	25–29 Netherlands	30–34 France	30–34 England and Wales	30–34 Netherlands	35–39 France	35–39 England and Wales	35–39 Netherlands	40–44 France	40–44 England and Wales	40–44 Netherlands	45–49 France	45–49 England and Wales	45–49 Netherlands
1941																					
1942																					
1943	900	...	...	5,967	...	...	6,257	...	...	4,639	...	...	2,871	...	...	1,061	...	...	85	...	...
1944	878	...	...	5,786	...	...	6,481	...	...	4,832	...	...	3,017	...	...	1,124	...	...	94	...	...
1945	921	...	...	5,766	...	...	6,723	...	...	4,930	...	...	3,107	...	...	1,155	...	...	102	...	...
1946	1,035	838	658	6,930	5,995	5,511	9,214	7,860	11,231	7,175	5,760	11,393	4,039	3,245	7,749	1,305	918	2,920	108	66	227
1947	1,173	951	742	8,014	7,161	5,440	9,168	8,498	10,318	6,529	5,902	10,049	3,847	3,255	7,234	1,323	960	2,975	119	69	219
1948	1,185	1,043	688	8,128	6,793	4,995	9,108	7,240	9,673	6,422	4,960	9,151	3,774	2,750	6,569	1,299	855	2,747	115	63	225
1949	1,203	1,099	620	8,197	6,604	4,835	9,132	7,000	9,425	6,351	4,625	8,615	3,634	2,515	5,984	1,241	705	2,463	115	56	211
1950	1,194	1,077	614	8,105	6,297	4,707	8,954	6,833	9,066	6,206	4,588	8,308	3,531	2,388	5,727	1,203	698	2,305	106	51	195
1951	1,136	1,043	656	7,873	6,279	4,853	8,508	6,687	9,015	5,822	4,435	8,032	3,318	2,230	5,510	1,133	667	2,195	99	47	191
1952	1,107	1,060	691	7,792	6,449	4,999	8,457	6,835	9,258	5,766	4,325	8,081	3,286	2,190	5,423	1,118	645	2,177	97	47	196
1953	1,080	1,128	672	7,690	6,706	4,931	8,321	6,950	9,171	5,544	4,445	7,989	3,137	2,170	5,239	1,038	623	2,107	90	44	178
1954	1,065	1,153	658	7,752	6,770	5,029	8,384	7,060	9,348	5,509	4,330	7,933	3,162	2,165	5,095	1,045	637	2,022	90	41	177
1955	1,049	1,202	698	7,739	6,821	5,139	8,394	7,114	9,490	5,387	4,310	7,839	3,029	2,130	5,022	1,015	597	1,948	84	40	168
1956	1,068	1,363	710	7,786	7,451	5,301	8,418	7,556	9,702	5,321	4,478	7,850	2,926	2,204	4,975	978	627	1,896	79	40	157
1957	1,025	1,453	738	7,737	7,699	5,549	8,699	7,862	10,009	5,401	4,584	7,799	2,915	2,275	4,719	969	641	1,837	77	41	153
1958	1,056	1,555	753	7,717	7,980	5,794	8,710	8,047	10,190	5,394	4,730	7,766	2,864	2,225	4,640	970	640	1,738	73	41	148
1959	1,153	1,644	816	7,926	8,053	6,042	8,862	8,190	10,494	5,495	4,780	7,845	2,859	2,200	4,605	995	630	1,711	79	39	154
1960	1,231	1,804	850	8,131	8,307	6,084	8,831	8,074	10,402	5,350	4,960	7,613	2,726	2,330	4,429	925	649	1,636	74	42	135
1961	1,288	1,942	928	8,450	8,597	6,449	9,130	8,817	10,702	5,476	5,123	7,870	2,776	2,395	4,320	920	664	1,576	76	44	139
1962	1,286	2,047	975	8,433	8,889	6,647	9,079	9,030	10,625	5,394	5,220	7,642	2,690	2,420	4,201	874	651	1,480	76	43	132
1963	1,375	2,115	1,042	8,861	8,954	6,904	9,322	9,123	10,723	5,580	5,315	7,603	2,746	2,444	4,103	974	656	1,426	75	44	124
1964	1,413	2,188	1,045	9,069	9,074	7,076	9,283	9,226	10,666	5,571	5,364	7,454	2,743	2,485	3,971	866	650	1,326	77	45	113
1965	1,419	2,209	1,035	8,980	8,919	7,147	9,020	8,928	10,342	5,420	5,130	6,922	2,645	2,396	3,637	821	638	1,196	76	44	100
1966	1,354	2,217	1,057	8,858	8,758	7,136	8,835	8,633	10,007	5,359	4,856	6,406	2,606	2,256	3,255	815	596	1,065	67	40	94
1967	1,293	2,302	1,084	8,425	8,403	7,219	8,444	8,257	9,599	5,122	4,753	6,005	2,499	2,169	2,944	761	568	968	61	38	79
1968	1,288	2,354	1,069	8,159	8,111	7,215	8,147	8,001	9,506	4,964	4,376	5,699	2,419	2,025	2,754	737	529	828	60	33	74
1969	1,299	2,417	1,136	7,951	7,759	7,354	7,961	7,723	9,718	4,882	4,158	5,721	2,351	1,872	2,688	715	482	787	62	30	65
1970	1,334	2,454	1,135	7,890	7,646	6,796	7,783	7,486	9,199	4,664	3,924	5,362	2,255	1,725	2,448	676	437	702	57	26	58
1971	1,398	2,550	1,135	7,950	7,635	6,658	7,842	7,778	8,455	4,624	3,894	4,780	2,249	1,644	2,148	673	407	610	57	28	51
1972	1,472	2,391	1,002	7,808	7,018	6,234	7,556	7,033	8,149	4,365	3,484	4,145	2,107	1,439	1,674	641	359	458	50	24	44
1973	1,471	2,199	865	7,535	6,579	5,614	7,207	6,784	7,460	4,088	3,174	3,485	1,955	1,237	1,375	589	306	356	45	21	37
Limits FRG		1,000			4,500			4,500			2,500			1,000			200			10	
GDR		1,500			6,500			3,500			1,500			500							
1974[b]	1,407	2,000	800	7,130	6,220	5,300	6,595	6,500	7,150	3,582	3,010	3,200	1,670	1,070	1,200	503	250	300	32	16	30
1975[b]	1,390	1,900	750	6,600	5,600	5,100	6,220	6,100	6,850	3,100	2,800	3,000	1,500	950	1,150	425	200	300	25	10	25

[a] Sum by age group of fertility rates by year of age (per 10,000 women).
[b] For 1974 and 1975, the rates have been extrapolated in order to derive an annual number of births equal to the number observed when the rates are applied to the age-specific female population in the year in question.

58

Figure VII. Completed generation fertility over specific ages for the birth cohorts of 1930-1956, France
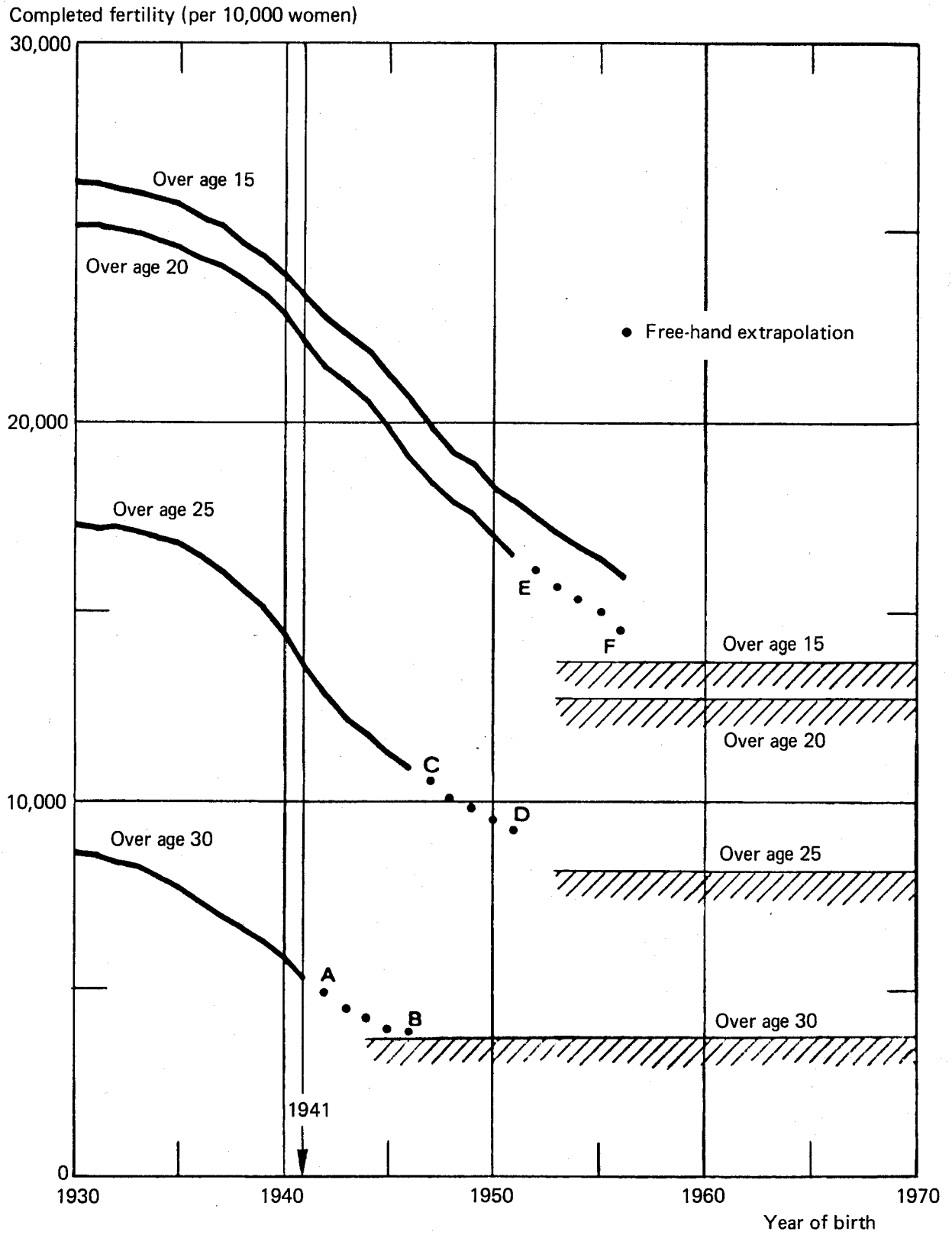
Note: Hatched areas mark the stabilization levels of the Federal Republic of Germany.

59

25 years and over is then "known" up to the 1946 cohort. The curve for 25 years and over is then extended in the direction of the limit of the Federal Republic of Germany up to the 1951 cohort (curve CD). Cumulative fertility for 20 years and over is therefore "known" up to the 1951 cohort. The curve representing this fertility is extended up to the 1956 cohort and the completed fertlity is "known" up to the 1956 cohort. This last curve is extended up to the "limit" of the Federal Republic of Germany (EF). The completed fertility is then "known" up to the 1961 cohort.

As stated earlier, the completed fertility for cohorts born after 1926 is a mixture of observation and extrapolations. On curve A in figure II, the percentages of extrapolation have been noted.

Lastly, in figure II, for the period after 1975, the curve of current data compatible with the curve of completed fertility obtained from figure VII has been plotted. In order to plot this compatible curve, a method of approximations by quinquennial age group was used.

Such a method is much faster than one using fertility rates by individual years of age. It is also more widely used, as the rates by individual years of age are not always available. It is therefore very interesting to see that the two methods produce very similar results. Some details on the method using quinquennial rates are given below.

P. Depoid used such a method in his study, *Reproduction nette en Europe depuis l'origine des statistiques de l'état civile.*[17] The basic data are given in table 12. Take, for example, the observed fertility rate for women 15–19 years during the period 1946–1950. It is equal to 23 per 1,000. It applies to the nine cohorts of 1927–1937. It is assumed that the rate of 23 per 1,000 gives an estimate of the fertility of the 15–19 age group for the median cohort, that of 1931. Reading table 12 diagonally, a series relating to one cohort emerges (the stepped line in table 12 relates to the 1901 cohort.) The result can be seen in table 13, which shows the rates from table 12 by cohort. Up to the stepped line in table 13 the rates are observed rates. The extrapolations begin below that line. On the last line, which corresponds to the 1976 cohort, are the "limit" rates of the Federal Republic of Germany. Under "completed fertility," column (2) gives the completed fertility from 1886 to 1926 estimated from the fertility rates by individual year of age, and column (1) gives the same completed fertility estimated from quinquennial fertility rates. The two methods clearly produce practically the same results.

After 1926, the figures for completed fertility in column (2) are derived from figure VII. The quinquennial rates below the stepped line have been found by trial and error, by extrapolating in the direction of the limit rates of the 1976 line in order to find in column (1) the same completed fertility as in column (2). These are the extrapolated fertility rates shown in

table 12 for the four five-year periods from 1976 to 1995.

The purpose of dwelling at length on the way of estimating the completed fertility of cohorts which have not yet reached the end of their reproductive period has been to demonstrate how cautious one must be in interpreting the curves obtained. In France, England and Wales, and the Netherlands, the slope of the curves is such that the decline in fertility appears unlikely to be arrested in the near future, but trend reversals cannot be totally excluded. They have been witnessed in the past. If, for example, in France the rates had levelled off at the level achieved in 1971–1975, the trend would be considerably different from that shown in figure VII.

Bearing these uncertainties in mind, one may examine the effects, in terms of completed generation fertility, of assuming that fertility will continue to decline to the level assumed to be the limit for the Federal Republic of Germany. The method explained in detail in connexion with France was applied to the Federal Republic of Germany, England and Wales, and the Netherlands. Figure VIII gives the four curves thus obtained. Clearly, the Federal Republic of Germany has the lowest completed fertility; fertility of 1.5 children per woman is almost achieved by the 1950 cohort. That cohort is now only 25 years old, so in figure VIII over 50 per cent of the completed fertility had to be estimated. In the case of the cohort born in 1945, only 20 per cent of the fertility is estimated and it is taken as being equal to 1.75. On the basis of past trends, the margin of error on the estimated portion cannot be much more than 50 per cent. The completed fertility of the 1947 cohort would then be somewhere between 1.96 and 1.61. The margin is obviously substantial. Despite these uncertainties, a completed fertility of 1.5 does not appear to be beyond the realm of possibility. A study of the consequences of so low a fertility is therefore justified.

Another question is whether the assumption that fertility will level off at such a level (1.5 children per woman) is reasonable. Since Europe entered the era of planned fertility, completed generation fertility has never remained stable. Figure I shows a first trough for cohorts born around 1900, followed by a peak for cohorts born around 1930; and, lastly, it suggests a new trough for the cohort born around 1960. There would accordingly be wide swings in planned completed fertility over periods of 30 years, a period which is a rough measure of the average age difference between parents and their children.

A projection calculated on the basis of these assumptions would be very instructive. Unfortunately, no such perspective is available.

Thus, although the analysis given above does not confirm beyond a doubt the emergence of a completed generation fertility equal to 1.5 children, it does suggest the possibility of such a development. Accordingly, theoretical projection II, based on the extrapolation of

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[17] P. Depoid, *Reproduction nette en Europe depuis l'origine des statistiques de l'état civile*, Etude démographique No 1 (Paris, Statistique générale de la France, 1941).

TABLE 12. AGE-SPECIFIC FERTILITY RATES, 1901–1975; AND EXTRAPOLATION FOR 1976–1995

(Rates per 1,000 women in each age group)

Year	15–19 Rate	15–19 Median cohort	20–24 Rate	20–24 Median cohort	25–29 Rate	25–29 Median cohort	30–34 Rate	30–34 Median cohort	35–39 Rate	35–39 Median cohort	40–44 Rate	40–44 Median cohort	45–49 Rate	45–49 Median cohort	Total fertility rate
1901–1905	19	1186	127	1881	160	1876	124	1871	82	1866	37	1861	6	1856	2.78
1906–1910	19	1891	127	1886	151	1881	113	1876	74	1871	31	1866	4	1861	2.59
1911–1915	17	1896	114	1891	131	1886	96	1881	63	1876	27	1871	3	1866	2.26
1916–1920	9	1901	66	1896	96	1891	78	1886	56	1881	25	1876	3	1871	1.66
1921–1925	17	1906	123	1901	146	1896	105	1891	65	1886	25	1881	3	1876	2.43
1926–1930	20	1911	123	1906	134	1901	97	1896	59	1891	22	1886	3	1881	2.29
1931–1935	25	1916	121	1911	127	1906	88	1901	51	1896	20	1891	3	1886	2.17
1936–1940	17	1921	120	1916	126	1911	85	1906	48	1901	17	1896	2	1891	2.08
1941–1945	16	1926	109	1921	124	1916	93	1911	57	1906	21	1901	2	1896	2.11
1946–1950	23	1931	158	1926	184	1921	130	1916	75	1911	26	1906	2	1901	2.99
1951–1955	22	1936	156	1931	168	1926	113	1921	63	1916	21	1911	2	1906	2.72
1956–1960	22	1941	159	1936	174	1931	107	1926	58	1921	19	1916	2	1911	2.71
1961–1965	25	1946	174	1941	183	1936	110	1931	54	1926	18	1921	1	1916	2.82
1966–1970	27	1951	162	1946	165	1941	100	1936	49	1931	15	1926	1	1921	2.60
1971–1975	29	1956	148	1951	142	1946	79	1941	38	1936	11	1931	0	1926	2.24
1976–1980	25	1961	117	1956	111	1951	56	1946	25	1941	6	1936	0	1931	1.70
1981–1985	23	1966	98	1961	97	1956	52	1951	21	1946	4	1941	0	1936	1.48
1986–1990	21	1971	92	1966	92	1961	50	1956	20	1951	4	1946	0	1941	1.37
1991–1995	20	1976	90	1971	90	1966	50	1961	20	1956	4	1951	0	1946	1.37

Note: In France, age-specific fertility rates have been published since 1943. The age considered is the age attained during the observation period. This is tantamount to classifying births by cohort. Prior to 1943, fertility rates were calculated only for certain years, usually the census years. Births statistics, on the other hand, are published by age group. It is easy to obtain a reliable estimate of the age distribution by interpolating between two censuses. It is therefore possible to calculate the age-specific rates, which was done here for the years 1901–1942. The concept of age used prior to 1942 is age at last birthday. The rates for years prior to 1943 must therefore be corrected to take account of the change in the concept of age and produce a homogeneous series. This table has been so corrected.

61

TABLE 13. AGE-SPECIFIC FERTILITY RATES FOR COHORTS BORN BETWEEN 1886 AND 1976

(Rates per 1,000 women in each age group)

Birth year of cohorts	Age group (years)							Completed fertility		
	15-19	20-24	25-29	30-34	35-39	40-44	45-49	(1)[a]	(2)[b]	Extrapolation (percentage)
1886................	19	127	131	78	65	22	3	2.22	2.21	
1891................	19	114	96	106	59	20	2	2.08	2.06	
1896................	17	66	146	97	51	17	2	1.98	2.00	
1901................	9	123	134	88	48	21	2	2.13	2.12	
1906................	17	123	127	85	57	26	2	2.18	2.18	
1911................	20	121	126	93	75	21	2	2.29	2.29	
1916................	25	120	124	130	63	19	1	2.41	2.41	
1921................	17	109	184	113	58	18	1	2.50	2.48	
1926................	16	158	168	107	54	15	1	2.60	2.60	
1931................	23	156	174	110	49	11	0	2.62	2.63	0.2
1936................	22	159	183	100	38	6	0	2.54	2.53	1.1
1941................	22	174	165	79	25	4	0	2.34	2.33	6.2
1946................	25	162	142	56	21	4	0	2.05	2.05	19.8
1951................	27	148	111	52	20	4	0	1.81	1.79	51.7
1956................	29	117	97	50	20	4	0	1.59	1.60	90.9
1961................	25	98	92	50	20	4	0	1.41	1.41	100.0
1966................	23	92	90	50	20	4	0	1.37	1.37	100.0
1971................	21	90	90	50	20	4	0	1.37	1.37	100.0
1976[c].............	20	90	90	50	20	4	0	1.37	1.37	100.0

[a] Calculated on the basis of age-specific rates.
[b] Calculated on the basis of rates by year of age up to the 1926 cohort. After 1926, the completed fertility is taken from figure VII
[c] Limit of the Federal Republic of Germany.

current indexes, also appears to be valid in terms of generation fertility.

Such is the trend in which Western and Northern Europe appear to be leading the rest of Europe and the Soviet Union. In this movement, the German Democratic Republic and the Federal Republic of Germany are even now reaching the stage that the other countries will come to at some point in the future.

Some other features of the demographic situation in Europe in 1975

In the Scandinavian countries of Europe, too, a new type of demographic behaviour appears to be emerging which will probably not have such fundamental consequences as the widespread and lasting decline in fertility, but which could substantially change mankind's cultural and social habits. Perhaps the best way of describing this new type of behaviour is to comment on the Swedish statistics. On the basis of table 14, the following observations can be made:

(a) Since 1966, there has been a considerable decline in the number of marriages per year in Sweden;

(b) At the same time, there has been an increase in illegitimate births. These two facts are not unrelated. The decline in the number of marriages does not in fact mean a reduction in the number of couples; it is accompanied by an increase in the number of couples who are not married but are sufficiently stable to have children whom the law then requires to be classified as illegitimate;

(c) Moreover, in 1974, the number of marriages increased. This was probably due to unmarried couples' feeling the need to regularize their union after a few years;

(d) The number of divorces has trebled in 10 years.

All these facts call into question the institution of the family inherited from centuries past. The place of women in society is likely to change accordingly. As concerns the technique for analysing demographic data, factors that have so far been considered negligible should from now on be taken into account:

(a) The number of abortions has increased tenfold in 10 years. That is a heading which will have to be added to the traditional headings describing the natural movement of a population. The countries of Eastern Europe have, in fact, already adopted it, and the progressive legalization of abortion will make the heading indispensable throughout Europe;

(b) The large migratory movements between other countries and Sweden should be noted. Table 15 allows a comparison between net arrivals of aliens and the number of persons entering into employment in

Figure VIII. Completed generation fertility for the birth cohorts of 1920-1956, England and Wales, France, Federal Republic of Germany and the Netherlands

Completed fertility (per 10,000 women)
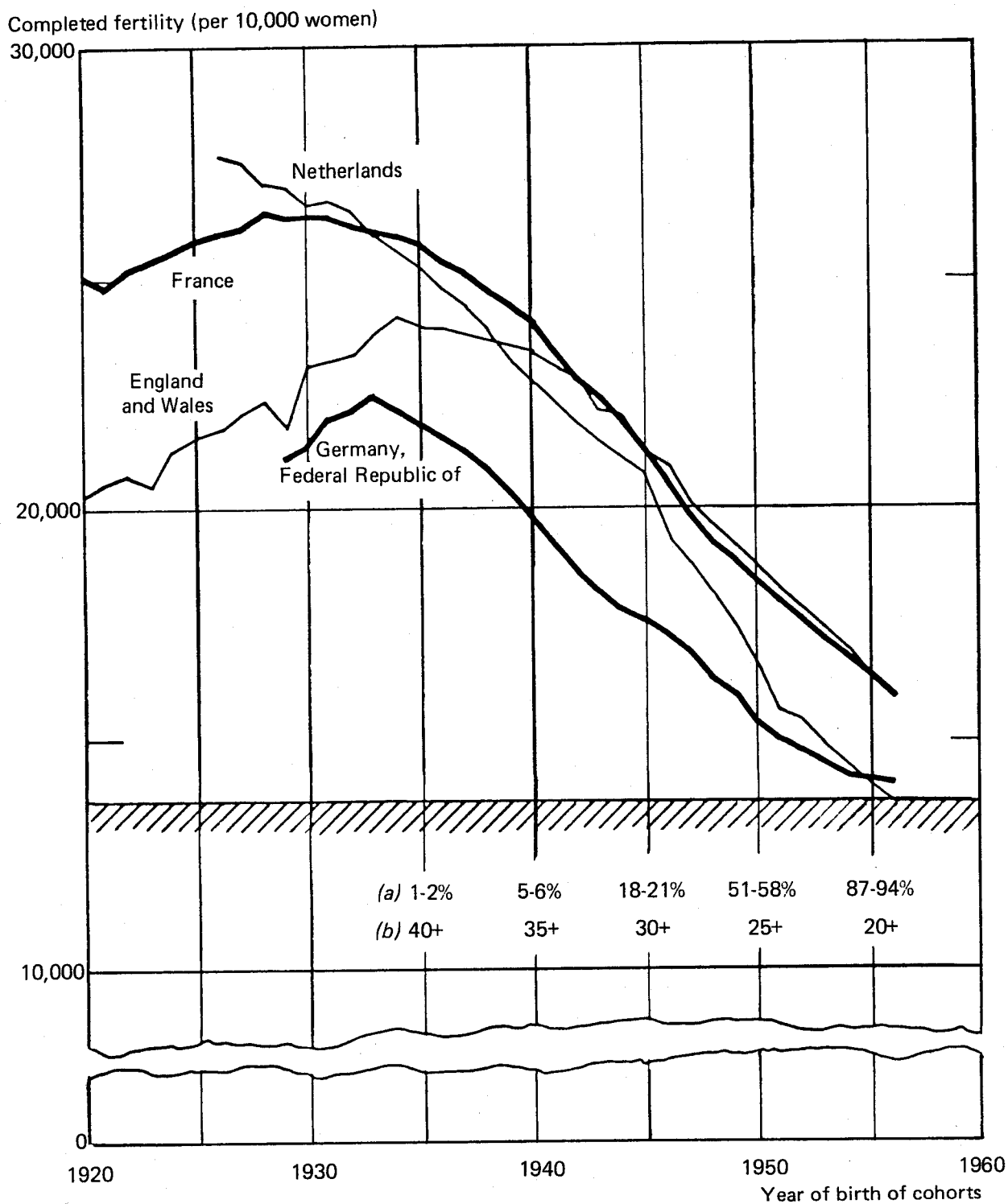
Notes: Hatched area marks the proposed stabilization level for the German Democratic Republic and the Federal Republic of Germany.

(*a*) Percentage of completed fertility extrapolated. This percentage varies, depending upon the country considered.

(*b*) Ages to which extrapolation applies.

63

TABLE 14. POPULATION OF SWEDEN, 1961–1974

Year	Population at midyear (thousands)	Marriages	Divorces	Live births	Deaths	Excess of births over deaths	Emigrants	Immigrants	Excess of immigrants over emigrants	Population growth	Illegitimate births	Infant deaths	Abortions
						A. Absolute numbers							
1961	7,520	52,449	8,696	104,501	73,555	30,946	15,019	29,619	14,600	44,061	12,216	1,647	2,909
1962	7,562	53,913	8,849	107,284	76,791	30,493	14,928	25,084	10,156	39,120	13,297	1,655	3,205
1963	7,604	53,480	8,496	112,903	76,460	36,443	15,340	26,950	11,610	46,359	14,172	1,735	3,528
1964	7,661	58,439	9,169	122,664	76,661	46,003	15,705	38,334	32,629	67,092	16,117	1,744	4,671
1965	7,734	59,963	9,563	122,806	78,194	44,612	15,977	49,586	33,609	77,306	16,950	1,639	6,208
1966	7,808	61,101	10,288	123,354	78,440	44,914	19,730	46,970	27,240	76,582	17,962	1,549	7,254
1967	7,868	56,561	10,722	121,360	79,783	41,577	19,979	29,983	10,004	49,686	18,323	1,560	9,703
1968	7,912	52,291	11,011	113,087	82,476	30,611	23,162	35,978	12,816	42,222	17,891	1,478	10,940
1969	7,968	48,357	12,238	107,622	83,352	24,270	20,360	64,503	44,143	68,495	17,517	1,264	13,735
1970	8,043	43,278	13,174	110,150	80,026	30,124	28,653	77,326	48,673	79,034	20,255	1,212	15,100
1971	8,098	39,918	13,682	114,484	82,717	31,767	39,560	42,615	3,055	34,731	27,781	1,270	19,250
1972	8,122	38,636	15,189	112,273	84,056	28,217	41,579	29,894	−11,685	15,691	28,142	1,215	24,170
1973	8,137	38,251	16,294	109,663	85,640	24,023	40,342	29,443	−10,899	13,124	31,114	1,082	35,990
1974	8,160	44,870	27,208	109,000	87,000	22,000	28,352	37,000	9,000	31,000	34,451	1,050	...
1975	8,124	43,800	27,800	103,700	87,802	15,900	26,900	45,050	18,100	36,000	...	...	...
				B. Numbers per 1,000 population or per 1,000 live births			Per 1,000 population					Per 1,000 live births	
1961		6.97	1.16	13.90	9.78	4.12	2.00	3.94	1.94	5.86	116.9	15.8	27.8
1962		7.13	1.17	14.19	10.16	4.03	1.97	3.32	1.35	5.17	122.4	15.4	29.9
1963		7.03	1.12	14.85	10.05	4.80	2.02	3.54	1.52	6.10	125.5	15.4	31.2
1964		7.63	1.20	16.01	10.01	6.00	2.05	5.00	2.95	8.84	131.4	14.2	38.1
1965		7.75	1.24	15.88	10.11	5.77	2.07	6.41	4.34	10.00	138.0	13.3	50.6
1966		7.83	1.32	15.80	10.05	5.75	2.53	6.02	3.49	9.04	145.6	12.6	58.8
1967		7.19	1.36	15.42	10.14	5.28	2.54	3.81	1.27	6.32	151.0	12.9	80.0
1968		6.61	1.39	14.29	10.42	3.87	2.93	4.55	1.62	5.34	158.2	13.1	96.7
1969		6.07	1.54	13.51	10.46	3.05	2.56	8.10	5.54	8.60	162.8	11.7	127.6
1970		5.38	1.64	13.70	9.95	3.75	3.56	9.61	6.05	9.83	183.9	11.0	146.2
1971		4.93	1.69	14.14	10.21	3.92	4.88	5.26	0.38	4.29	216.5	11.1	168.1
1972		4.76	1.87	13.82	10.35	3.47	5.12	3.68	−1.44	1.93	250.7	10.8	220.5
1973		4.70	2.00	13.48	10.52	2.95	4.96	3.62	−1.34	1.61	282.8	9.9	237.1
1974		5.52	3.28	13.36	10.66	2.70	3.43	4.53	1.10	3.80	...	...	...
1975		5.35	3.39	42.66	10.92	1.96	3.25	5.69	2.21	4.15	...	...	...

SOURCES: *Statistik Årsbok för Sverige* (Statistical Yearbook for Sweden), supplemented by data furnished by the National Central Statistical Office.

64

TABLE 15. COMPARISON OF FOREIGN IMMIGRANTS (NET) AND PERSONS ENTERING INTO EMPLOYMENT IN SWEDEN, 1961–1974

Year (n)	Persons entering into employment (estimate in thousands) [a]	Number of foreign immigrants (net)	
		Absolute number (thousands)	Percentage of persons entering into employment
1961...........	70	16	22.9
1962...........	80	11	13.8
1963...........	85	13	15.3
1964...........	95	24	25.3
1965...........	95	35	30.5
1966...........	95	29	15.3
1967...........	85	13	18.8
1968...........	85	16	54.1
1969...........	85	46	65.0
1970...........	80	52	8.8
1971...........	80	7	−8.8
1972...........	80	−7	−6.3
1973...........	80	−5	14.7
1974...........	75	11	...

[a] Seventy per cent of the births during the year $n - 20$ (numbers rounded).

Sweden. The extent to which an economy like that of Sweden needs foreign labour can be assessed; in periods of intense economic activity, immigrants have constituted up to 65 per cent of those entering the labour force. The extent to which the migratory flow is affected by fluctuations in the economy can also be seen. The migratory movement switches abruptly from one year to the next.

The projections commented on above, whether the "most likely" projections or the theoretical projections, do not generally make any allowance for international migration.[18] They assume that it will be nil. Past experience indicates the contrary. Indeed, the capitalist countries of Europe meet their labour needs with the help of international migration. This situation does cause social and cultural problems, because many workers come from non-European countries. The socialist countries of Europe obtain relief from another source, namely, female labour, which also raises problems—different, of course, but equally difficult.

Thus, the characteristics of population development in Europe as it enters the last quarter of the twentieth century are, in addition to the decline in fertility, the following:

(a) A new concept of the family is developing. The Scandinavian countries, and particularly Sweden, are in the forefront of this movement;

(b) Movements of workers from country to country, in accordance with the fluctuations of the economy, are intensive; and many of the workers come from non-European countries. In this respect, Switzerland is probably in the forefront.

Some of the economic and social consequences of these various changes have been mentioned in passing. It is time now to examine these consequences in rather

more detail, and that is the purpose of the second chapter of this article.

ECONOMIC AND SOCIAL CONSEQUENCES OF PROBABLE POPULATION DEVELOPMENT IN EUROPE FROM 1975 TO 2030

Total population and age distribution

Table 16 shows how the probable development of the total population of Europe from now up to 2030 continues the past trend. As was explained in the first chapter, there should be an excess of deaths over births before long. In table 16, this is reflected in a reduction in the total number of persons. The maximum will be reached in the period 1990–2000 or 2000–2010, depending upon the region. The differences between regions are not great, and it is sufficient to consider the total population of Europe. Regional deviations introduce only secondary variations in relation to the general trend. In 2030, the population of Europe will be at about the same level [19] as in 1960. But although the total number of persons is virtually the same in 1960 and 2030, the age distribution is very different, as is shown in table 17 and illustrated by figure IX. Between 1950 and 2030, there is a considerable increase in the proportion of old people (aging of the population) which is almost exactly offset by a reduction in the proportion of young people under 15 years of age; table 17 shows that the proportion of the total number of persons aged 0–14 years and 65 years and over should vary very little between 1950 and 2030. It should pass through a maximum about the year 2000, after passing through a minimum about 1970. Table 18 shows, by broad age groups, the development of the population, in the various regions of Europe, between 1970 and 2000. It will be noted that the regional differences are small in comparison with the over-all development.

The aging of the European population is at the root of the economic and social difficulties which Europe will encounter in the years to come. Before considering these difficulties, it is necessary to touch briefly on a problem of method.

A problem of method

Aging of the population poses problems because of the existence of phenomena which vary according to the age of individuals. These phenomena are described by referring to the concept of the average individual, in the form of a curve (or a numerical table) showing how a particular characteristic of this average individual varies with age. For example:

(a) Food consumption varies according to age. It is small at birth, then increases, stabilizes at the end of adolescence and declines towards the end of life.

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[18] Greece, Ireland, Italy and the Netherlands are exceptions.

[19] Here again, there are differences according to region. The level for 2030 corresponds to that for 1960 for Eastern and Western Europe, to 1950 for Northern Europe, to 1970 for Southern Europe and to 1980 for the Union of Soviet Socialist Republics.

TABLE 16. POPULATION OF EUROPE,ᵃ BY REGION, AND OF THE UNION OF SOVIET SOCIALIST REPUBLICS, 1920–2030

(Theoretical projection II; thousands)

Region or country	1920	1930	1940	1950	1960	1970ᵇ	1980	1990	2000	2010	2020	2030
Eastern Europe	78,702	87,745	94,855	88,500	96,710	102,942	108,446	110,296	110,671	108,076	103,018	95,963
Northern Europe	61,708	64,722	68,043	72,143	75,464	79,888	83,649	83,845	82,780	80,164	76,611	71,413
Western Europe	101,058	108,253	112,919	122,104	134,150	147,754	151,811	152,379	151,359	146,523	139,129	129,405
Southern Europe	82,530	92,352	102,216	108,197	117,141	127,305	136,249	139,594	141,200	138,877	133,278	125,501
TOTAL	323,998	353,072	377,933	390,944	423,465	457,889	480,155	486,114	486,010	473,640	452,036	422,282
USSR	155,300	179,000	195,000	180,075	214,238	242,768	264,347	277,094	282,951	280,402	270,439	255,814

SOURCES: From 1920 to 1940, *World Population Prospects as Assessed in 1963* (United Nations publication, Sales No. 66.XIII.2), p. 159; for 1950 and 1960, *World Population Prospects as Assessed in 1968* (United Nations publication, Sales No. E.72.XIII.4), pp. 119–120; for 1970, "*World population prospects 1970–2000 as assessed in 1973*," (ESA/P/WP.53), p. 14.

ᵃ Not including the total population of Europe, but only the population of territories and countries with over 200,000 population. The omitted population developed as follows:

	1920	1930	1940	1950	1960	1970
Percentage of the total population of Europe.	802	875	887	1,020	1,098	1,195
	2.47	2.47	2.34	2.60	2.59	2.60

ᵇ For 1970, the ECE secretariat uses a slightly different population estimate:

Eastern Europe	102,942
Northern Europe	80,310
Western Europe	148,080
Southern Europe	127,696
TOTAL	459,028

See *Economic Survey of Europe in 1974* (United Nations publication, Sales No. E.75.II.E.16), part two.

66

TABLE 17. AGE STRUCTURE OF POPULATION OF EUROPE, 1950–2030

Age group (years)	1950	1960	1970	1980	1990	2000	2010	2020	2030
0–4	910	888	830	641	561	537	465	436	410
5–9	794	858	836	746	600	556	502	461	450
10–14	828	832	824	793	635	554	542	483	470
15–19	810	724	794	796	731	599	569	524	491
20–24	803	744	759	779	801	630	584	567	512
25–29	774	719	658	754	775	730	602	598	552
30–34	593	720	672	721	751	770	642	607	603
35–39	721	705	656	625	727	770	742	623	635
40–44	729	513	653	637	694	750	781	664	634
45–49	676	641	638	615	600	733	779	769	666
50–54	584	638	452	605	604	682	748	798	696
55–59	482	572	562	570	572	572	702	775	776
60–64	422	473	527	388	538	560	634	708	790
65–69	342	363	440	451	478	509	500	625	740
70–74	258	610	317	392	352	430	492	580	621
75 and over	274	...	382	487	581	618	716	782	954
ALL AGES	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000
0–14	2,532	2,578	2,490	2,180	1,796	1,647	1,509	1,380	1,330
15–24	1,613	1,468	1,553	1,575	1,532	1,229	1,153	1,091	1,003
25–44	2,817	2,657	2,639	2,737	2,947	3,020	2,767	2,492	2,424
45–64	2,164	2,324	2,179	2,178	2,314	2,547	2,863	3,050	2,928
65 and over	874	973	1,139	1,330	1,411	1,557	1,708	1,987	2,315
ALL AGES	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000
0–14 and 65 and over	3,406	3,551	3,629	3,510	3,207	3,204	3,217	3,367	3,645
15–64	6,594	6,449	6,371	6,490	6,793	6,796	6,783	6,633	6,355
ALL AGES	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000

(b) Male economic activity is nil until about 15 years of age, increases to 97 per cent at about 25 years, remains at that level until the age of 50 and then begins to decline steadily (retirement);

(c) Female economic activity follows a different curve, as the arrival of children brings about reductions of activity followed by resumptions;

(d) The consumption of medical care increases with age. There is an upward curve which rises sharply at the end, in extreme old age;

(e) Disposable income, which is nil until about the age of 15 years, increases to a maximum and then declines.

There are many other phenomena which vary with age, in the most diverse areas—economic, social, cultural, biological, physiological, psychological, etc. Each is characterized by a curve which can be called "A". To obtain an over-all measurement of the phenomenon represented by a particular curve A, the values of A must be multiplied by the number of average individuals of each age, that is, by the successive numbers of the population pyramid. If a pyramid in relative numbers is used (i.e., if the proportion of persons of each age is calculated), one can obtain a picture of the phenomena under consideration related to the population. This pyramid of relative ages can be called "B".

The over-all problem arises from the multiplication A × B. It will vary in intensity when there is a variation in A or B or A and B.

The variations of B correspond to what is referred to above as the aging (or the rejuvenation) of the population. It can now be seen clearly how the aging of a population affects the magnitude of problems. The variations of curve B become meaningful only by association with a curve A.

But, as stated above, the variations of curve A produce effects that are identical in all respects with the variations of curve B; and what one observes is actually a complex phenomenon, where it is often difficult to distinguish the part played by each. It is particularly difficult when demographic factors are responsible for the variations of curve A. These factors then operate on both curves and it is not easy to gauge their effects.

To give a specific example, one may take as curve A the cost of medical care, the need for which increases greatly with age, and see what happens during the period of demographic transition.

The decline in mortality does not greatly change the age distribution, that is to say, curve B. However, this decline is associated with considerable changes in the cost of care. More precisely, the factors that cause the decline in mortality, namely, advances in medicine, are also those which make medical care more and more expensive. In the product A × B, A increases and it can be said that the decline in mortality increases the burden of medical care.

The decline in fertility has no effect on A, but it does affect B. It produces aging. Therefore, A × B

Figure IX. Trend of age structure in Europe, 1950-2030

Figure IX. Trend of age structure in Europe, 1950-2030
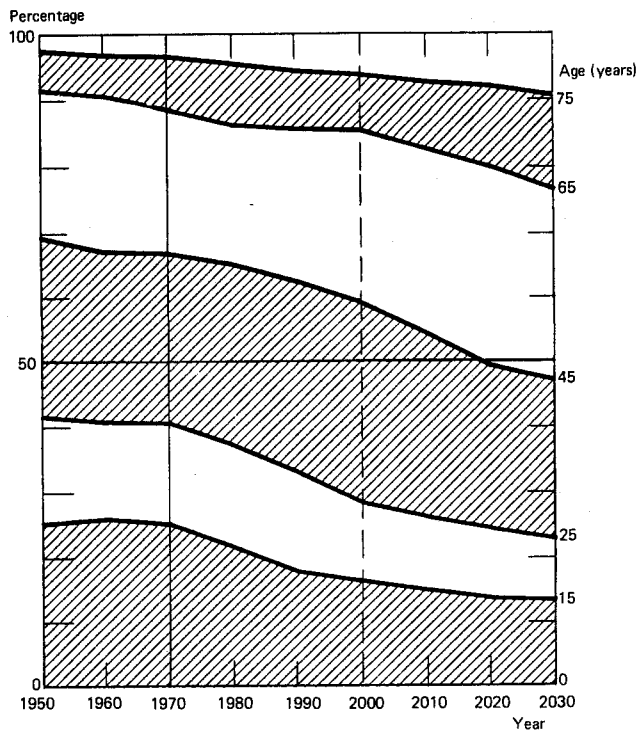
increases and it can be said that the decline in fertility increases the burden of medical care.

Thus, the decline in mortality and the decline in fertility have similar effects, and, in practice, these effects cannot be separated. However, the two declines operate in a very different way; one affects A and the other B.

After this digression into the technique of population analysis, some specific problems of aging are reviewed. The discussion deals with some particular curves A which will be combined with curve B as described in table 17 and illustrated in figure IX.

Economic activity and inactivity

As an example of behaviour varying with age, one may consider first economic activity and its counterpart, economic inactivity. The percentage of active persons at various ages is an indicator of this behaviour. Changes in the percentage over the years are both similar and different according to sex. There is a reduction in the percentage of activity for both males and females before 20 and after 65 years of age. This reduction reflects the prolongation of schooling for young people and the earlier retirement of old people.

Between the ages of 20 and 64, the variations are more diverse. For males, the prolongation of schooling to include higher education brings about a reduction in economic activity between the ages of 20 and 24. For females, there are two contrary trends. Economic activity diminishes as a result of the prolongation of

schooling to include higher education, but increases as a result of a very widespread phenomenon which is reflected over the years in greater participation by women, at all ages, in economic activity. The net effect of these two contrary movements is that the second overrides the first and the activity rate between the ages of 20 and 24 years tends to increase over the years.

From 25 to 44 years of age, the economic activity of men is practically stable, while that of women increases.

Between 45 and 64, male activity tends to diminish, no doubt because of early retirement, especially after the age of 55. In the case of women, there are, no doubt, two further contrary movements, with the increase in economic activity far outweighing early retirement.

Table 19 summarizes and specifies these indications. For 1950, activity rates prepared by the United Nations Secretariat have been used. The average rate in industrialized countries has been worked out. For 1970 and 2000, activity rates estimated by the International Labour Office have been used. For the year 2030, the curves from 1950 to 2000 have been extrapolated.

Figure X shows how this extrapolation follows the trend. A significant increase in activity by women between the ages of 25 and 64 has been assumed, but it will be noted that the rates used for 2030 are very close to those forecast for the Soviet Union by the International Labour Office for 2000.[20]

It is the combination of figures IX and X, representing in the particular case curves A and B as previously discussed, that will produce the development of the economically active and inactive population. First to be considered is the past, from 1950 to 1970.

By applying the 1950 activity rates to 1970, one obtains an active population as it would have been if the following three phenomena had not been operating:

(a) Prolongation of schooling;

(b) Earlier age of retirement;

(c) Increase in female activity.

A comparison of this fictitious active population with that of 1950 permits the effects of age distribution alone to be gauged. Next, a comparison of this fictitious active population with that actually observed in 1970 permits the effects of the three factors which have just been mentioned to be gauged. Tables 20, 21 and 22 give detailed computations for the male population from 1950 to 1970. It can be seen immediately that for men the effects of cultural, economic and social factors between 1950 and 1970 were considerable. They were of the same order as the effects of demographic factors. One can see what a limited picture would be obtained if consideration were limited to demographic factors. That, however, is what is done when the effects of aging of the population are described only in terms of the variations in age distribution. In table 21, in particular, it can be seen that demographic factors are responsible for an increase of 3,463,000 in the number

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[20] The decline in fertility will probably be conducive to female work.

68

TABLE 18. DISTRIBUTION BY BROAD AGE GROUPS OF POPULATION OF THE REGIONS OF EUROPE AND OF THE UNION OF SOVIET SOCIALIST REPUBLICS, 1970–2030

Age group (years)	Eastern Europe			Northern Europe			Western Europe		
	1970	2000	2030	1970	2000	2030	1970	2000	2030
0–14	2,406	1,639	1,341	2,415	1,658	1,340	2,420	1,660	1,364
15–64	6,553	6,872	6,392	6,317	6,701	6,288	6,301	6,782	6,375
65 and over	1,041	1,489	2,267	1,268	1,641	2,372	1,279	1,558	2,261
ALL AGES	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000

Age group (years)	Southern Europe			Total Europe			USSR		
	1970	2000	2030	1970	2000	2030	1970	2000	2030
0–14	2,642	1,644	1,288	2,490	1,647	1,330	2,864	1,731	1,379
15–64	6,375	6,785	6,428	6,371	6,796	6,355	6,356	6,918	6,395
65 and over	983	1,571	2,384	1,139	1,557	2,315	780	1,351	2,226
ALL AGES	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000

TABLE 19. ACTIVITY RATES FOR MALES AND FEMALES IN EUROPE, 1950–2030; AND FOR FEMALES IN THE UNION OF SOVIET SOCIALIST REPUBLICS, 2000

(Percentage)

Age group (years)	Male				Female				Female USSR [a]
	Circa 1950	1970	2000	2030	Circa 1950	1970	2000	2030	2000
10–14	4.5	3.8	0.7	0.0	2.7	2.5	0.6	0.0	0.6
15–19	70.0	59.0	38.6	20.0	48.7	46.0	29.9	15.0	35.4
20–24	91.9	87.6	79.5	73.0	56.0	59.3	62.7	75.0	83.4
25–44	97.4	97.4	97.4	97.4	33.2	45.3	53.4	80.0	83.6
45–54	95.0	95.0	93.6	91.0	30.1	43.8	57.1	75.0	76.2
55–64	86.0	81.3	75.5	70.0	23.3	30.6	34.3	40.0	42.4
65 and over	47.0	26.4	12.8	4.0	10.5	8.6	5.7	4.0	12.5

SOURCES: For 1950, *Demographic Aspects of Manpower: Sex and Age Patterns of Participation in Economic Activities* (United Nations publication, Sales No. 61.XIII.4); for 1970 and 2000, International Labour Office, "World and regional labour force prospects to the year 2000", *Population Debate: Dimensions and Perspectives, Papers of the World Population Conference, Bucharest, 1974*, vol. I (United Nations publication, Sales No. E/F/S.75.XIII.4), part two, pp. 308–09, table 8.

[a] Forecast by International Labour Office.

of inactive men aged 65 years and over. Social factors add to this burden 4,350,000 inactive men, or a larger number than that due to demographic factors. Indeed, since the beginning of the twentieth century, progressively earlier retirement, which is reflected in the fall in activity rates after the age of 65 years, has been one of the ways of "consuming" advances in productivity. Compared with 1900, a man now works fewer hours per day, fewer days per week, fewer weeks per year and also fewer years during his life. It is this reduction in the number of working years during life which is reflected after the age of 65 in an increase in the inactive population shown in the above-mentioned tables under the heading "Effects of social factors". It should be noted that this increase in the inactive population means a reduction of the active population by the same number, which further increases the additional burden due to social factors.

Similar computations have been made for the periods 1970–2000 and 2000–2030. Lastly, the same computations have been made for women; in their case, the development has been different because of the increase in female activity over the years. Table 23, similar to table 21, and table 24, similar to table 22, merit a few comments.

Between the ages of 20 and 24, the increase in female activity over the years masks the effects of the prolongation of schooling. The combined effect of the two factors, which is reflected in an increase of 565,000 in the number of active women between 1950 and 1970, can be observed. By applying to women the effect of the prolongation of schooling measured for men in table 21, one is led to believe that this increase of 565,000 active women between the ages of 20 and 24 is the result of a reduction of 215,000 accounted for by women prolonging their schooling and an increase of 780,000 in the number entering into employment.

For persons aged 65 years and over, demographic factors seem to be by far the most important. Between 1950 and 1970, these factors are responsible for an increase of 10,516,000 in the number of inactive women, while social factors increase the number of inactive women by only 595,000.

Figure X. Rates of economic activity by sex and major age group, Europe, 1950-2030
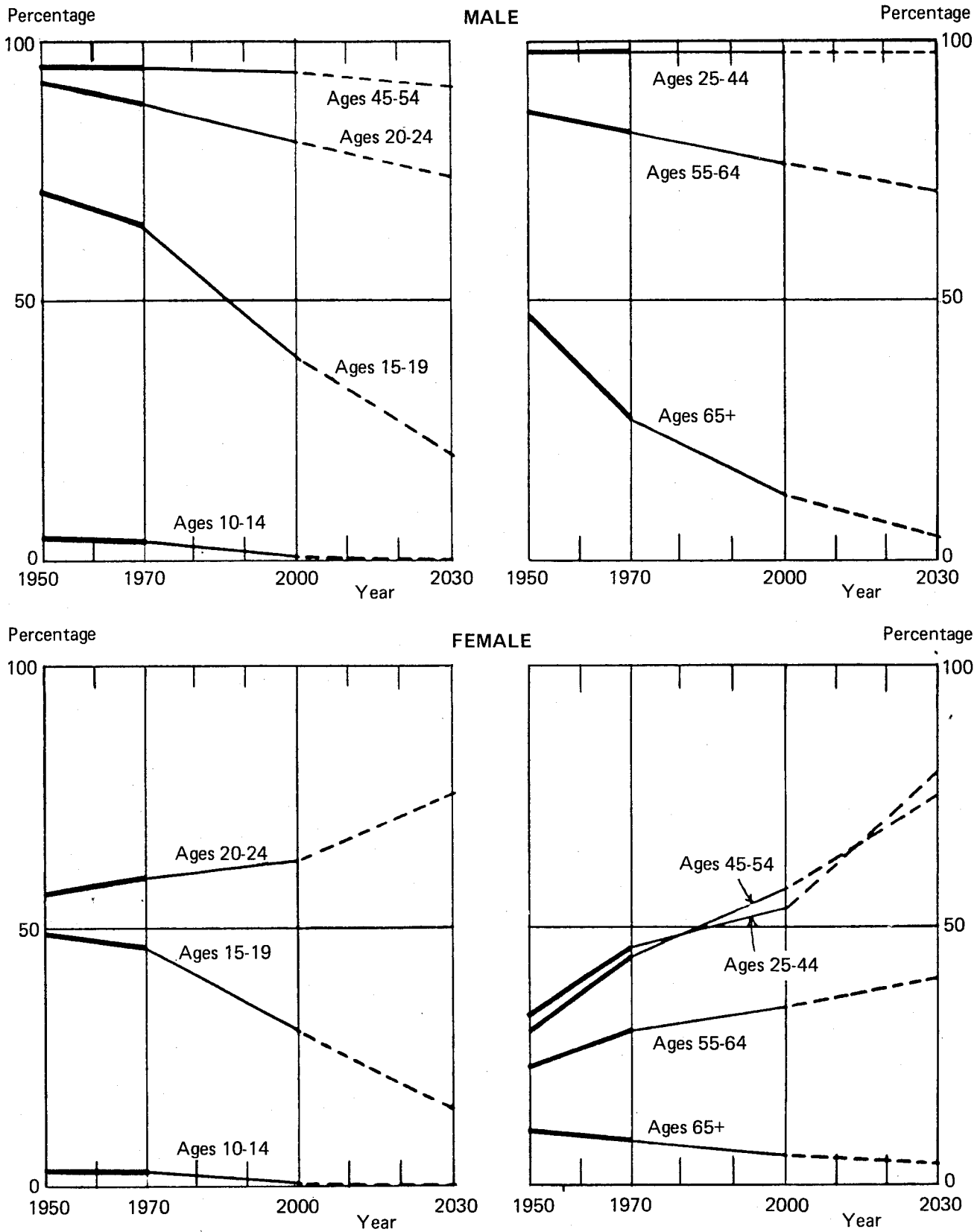
MALE

Ages 45-54

Ages 20-24

Ages 15-19

Ages 10-14

Ages 25-44

Ages 55-64

Ages 65+

FEMALE

Ages 20-24

Ages 15-19

Ages 10-14

Ages 45-54

Ages 25-44

Ages 55-64

Ages 65+

70

TABLE 20. ECONOMICALLY ACTIVE AND INACTIVE MALE POPULATION, EUROPE, 1950 AND 1970

(Population in thousands)

Age group (years)	Total population in 1950	1950 activity rates (percentage)	Active population in 1950	Inactive population in 1950	Total population in 1970	1950 activity rates (percentage)	Active population in 1970 at 1950 rates	Inactive population in 1970 at 1950 rates	1970 activity rates (percentage)	Active population in 1970 at 1970 rates	Inactive population in 1970 at 1970 rates
0–4.......	18,179			18,179	19,512			19,512			19,512
5–9.......	15,873			15,873	19,658			19,658			19,658
10–14......	16,420	4.5	739	15,681	19,351	4.5	871	18,480	3.8	735	18,616
15–19......	15,911	70.0	11,138	4,713	18,605	70.0	13,024	5,581	59.0	10,977	7,628
20–24......	15,363	91.9	14,120	1,244	17,694	91.9	16,261	1,433	87.6	15,500	2,194
25–44......	52,398	97.4	50,948	1,360	60,738	97.4	59,159	1,579	97.4	59,159	1,579
45–54......	23,300	95.0	22,135	1,165	23,466	95.0	22,293	1,173	95.0	22,293	1,173
55–64......	15,560	86.0	13,382	2,178	22,943	86.0	19,731	3,212	81.3	18,653	4,290
65 and over.	14,582	47.0	6,854	7,728	20,909	47.0	9,827	11,082	26.4	5,520	15,389
TOTAL	187,497		119,316	68,181	222,876		141,166	81,710		132,837	90,039
			——— 187,497 ———				——— 222,876 ———			——— 222,876 ———	

The two meanings of female activity: in terms of production and in terms of retirement

There are two possible meanings of female inactivity, and a distinction must be drawn between inactivity in terms of economic production and inactivity in terms of retirement.

Women can be classified in the following six categories, where the terms "active" and "inactive" should be understood in terms of economic production:

(1) Inactive wives of active men;
(2) Active wives of active men;
(3) Active wives of inactive men;
(4) Inactive wives of inactive men;
(5) Active widows and divorcees;
(6) Inactive widows and divorcees.

In terms of retirement, only categories (4) and (6) should be considered inactive. From that standpoint, the wife of an active man should not be considered inactive, because she is linked to the working population through her husband. In terms of economic production, categories (1), (4) and (6) are considered inactive.

To calculate the total numbers in each of the above-listed six categories is not an easy task and would, in itself, require a special study. A rough estimate of the total number in category (1) can be obtained by assuming that all active men below the age of 65 are married and by using their total number to estimate the number of women who are inactive in terms of retirement. Table 25 shows details of the computation for persons aged 65 years and over in 1950 and 1970. According to these estimates, the effects of social factors are of the same order of magnitude for men and women, as table 26 shows.

The working population

The results of all these computations are now considered. Table 27 shows the development of the total male and female working population. As a result of increased female activity, the total working population

in 2030 will be only slightly smaller than that in 1970. Moreover, this entails an appreciable increase in the proportion of females within the total working population. The number of active women per 1,000 active men increases by 81.4 per cent from 1950 to 2030. As a result, jobs traditionally held by men will, no doubt, in the future be performed by women.

Table 28 shows the development of the male working population from 1950 to 2030; and table 29, the development of the female working population. These tables show considerable aging of the working population, both male and female. Opinions are divided on the effects of such aging. The presence of workers who are older, and therefore more experienced, is counted as an asset. On the other hand, older workers are less able to benefit from the occupational retraining which appears to be increasingly necessary in the current age of technological progress.

One harmful consequence of aging of the working population is that it slows career advancement. Table 28 shows why this is so. For the sake of simplicity, one may assume that all "managers and supervisors" are at least 45 years of age and that their subordinates are recruited from among those under the age of 45. The number of managers and supervisors will be proportionate to the work force under 45 years of age, and the last two lines of the table show that the likelihood of attaining a managerial or supervisory position decreases

by $\frac{1181}{1815}$ or 65 per cent, between 1950 and 2030. In

the case of women, the same computation gives a decrease of 53 per cent. As regards career advancement, men and women should be considered separately, since male and female jobs are not interchangeable. Broadly speaking, therefore, it will be twice as difficult to rise to a position of responsibility in 2030 as it was in 1950.

At its worst, this aging of the working population is reflected in a decline of the rates of entry of young people into the labour force.

71

Table 21. Variations in the active and inactive male population of Europe, 1950–1970

(Thousands)

Age group (years)	Active population Variations from 1950 to 1970 owing to:		Inactive population Variations from 1950 to 1970 owing to:	
	Demographic factors	Cultural, economic and social factors	Demographic factors	Cultural, economic and social factors
0–4			+ 1,100	
5–9			+ 3,865	
10–14	+ 129	− 135	+ 2,730	+ 135
15–19	+ 1,715	−2,020	+ 735	+2,020
20–24	+ 2,332	− 770	+ 206	+ 770
25–44	+ 8,516	0	+ 227	0
45–54	+ 105	0	+ 6	0
55–64	+ 6,357	−1,079	+ 1,035	+1,079
65 and over	+ 3,070	−4,350	+ 3,463	+4,350
All ages	+22,224	− 8,354	+13,367	+8,354

Table 23. Variations in the active and inactive female population of Europe, 1950–1970

(Thousands)

Age group (years)	Active population Variations from 1950 to 1970 owing to:		Inactive population Variations from 1950 to 1970 owing to:	
	Demographic factors	Cultural, economic and social factors	Demographic factors	Cultural, economic and social factors
0–4			1,201	
5–9			3,567	
10–14	+ 67	− 37	2,426	+ 37
15–19	+ 998	− 481	1,051	+ 481
20–24	+ 604	+ 565	475	− 565
25–44	+ 851	+ 7,307	1,713	− 7,307
45–54	+ 164	+ 3,631	381	− 3,631
55–64	+1,689	+ 1,973	5,557	− 1,973
65 and over	+1,233	− 595	10,516	+ 595
All ages	+5,606	+12,363	26,887	−12,363

Table 22. Change in the male population of Europe, 1950–1970

(Thousands)

	Active population	Inactive population	Total population
Population in 1950	119,316	68,181	187,497
Effect of demographic factors	+22,224	+13,367	35,591
Population in 1970 resulting from effect of demographic factors	141,540	81,548	223,088
Effect of cultural, economic and social factors	− 8,354	− 8,354	0
Population in 1970 resulting from effect of all factors	133,186	89,902	223,088

Table 24. Change in the female population of Europe, 1950–1970

(Thousands)

	Active population	Inactive population	Total population
Population in 1950	50,756	152,691	203,447
Effect of demographic factors	+ 5,606	+26,887	32,493
Population in 1970 resulting from effect of demographic factors	56,362	179,578	235,940
Effect of cultural, economic and social factors	+12,363	−12,363	0
Population in 1970 resulting from effect of all factors	+68,725	167,215	235,940

As far as males are concerned, each year there is an average generation of youth seeking employment.[21] The average generation is taken to be one fifth of the total 15–19 age group. In the case of females, the same average generation, multiplied by the average of the female activity rates at ages 15–19 and 20–24, is taken. If these average generations are compared with the total size of the working population, an estimate of the rates of entry can be obtained:

	1950	1970	2000	2030
		(percentage)		
Male	25.8	26.9	21.2	15.7
Female	31.7	26.2	16.6	11.0

A high rate of entry makes for easy replacement of the working population. A low rate of entry reduces the ability to adapt to new conditions.

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[21] As the male activity rate at adult age is 97.5 per cent, it is actually 97.5 per cent of the average generation that is seeking employment. This refinement has been disregarded.

The inactive population

Table 30 shows the development of the population that is inactive in terms of production. In the case of females, the table also shows the estimated number of older women who are active in terms of retirement. These are the wives of active men (a rough estimate of the number of such women is obtained from the number of active men aged 65 and over).

This inactive population comprises a number of categories:

(a) *Pre-school-age children.* They are represented here by the 0–4 age group;

(b) *Children, adolescents and young adults receiving education.* This is the 5–24 age group;

(c) *Persons of working age who do not work.* They are represented by the 25–64 age group. The only point to be noted is that there are many more women than men. This group, in fact, comprises two distinct populations. First, the men are all in the 55–64 age bracket.

72

TABLE 25. ACTIVE AND INACTIVE POPULATION AGED 65 YEARS AND OVER, BY SEX, EUROPE, 1950 AND 1970

(*Thousands*)

	Male			Female		
	Total	*Active*	*Inactive*	*Total*	*Active*	*Inactive*
A. *Active and inactive in terms of production*						
Population in 1950...........	14,582	6,854	7,728	19,586	2,057	17,529
Population in 1970:						
Resulting from effect of demographic factors........	21,115	9,924	11,191	31,335	3,290	28,045
Resulting from effect of all factors....................	21,115	5,574	15,541	31,335	2,695	28,640
B. *Active and inactive in terms of retirement*						
Population in 1950...........	14,582	6,854	7,728	19,586	2,057	17,529 [a] −6,854 [b]
						10,675 [c]
Population in 1970:						
Resulting from effect of demographic factors........	21,115	9,924	11,191	31,335	3,290	28,045 [a] −9,924 [b]
						18,121 [c]
Resulting from effect of all factors....................	21,115	5,574	15,541	31,335	2,695	28,640 [a] −5,574 [b]
						23,066 [c]

[a] Inactive female population in terms of production.
[b] Active male population (assuming that it equals the number of inactive females married to active males).
[c] Inactive female population in terms of retirement.

TABLE 26. VARIATIONS IN INACTIVE POPULATION,[a] OF EUROPE, BY SEX, 1950–1970

(*Thousands*)

	Male	Female
Effects of demographic factors......	3,463	5,446
Effects of social factors............	4,350	4,945

[a] Inactive in terms of retirement.

TABLE 27. TOTAL ECONOMICALLY ACTIVE POPULATION, BY SEX, EUROPE, 1950–2030

(*Sex distribution; (thousands)*)

Sex	1950	1970	2000	2030
Male..................	119,316	133,186	146,771	111,940
Female...............	50,756	68,725	83,969	86,344
TOTAL	170,072	201,911	230,740	198,284
Active women per 1,000 active men...........	425	514	572	771

Most of these men have opted for early retirement.[22] Consequently, they are inactive in terms of retirement. The women, for their part, are mostly the wives of men who are probably active. They are therefore inactive in terms of production, but active in terms of retirement. As a result of increased female activity over the years, this category is tending to decrease. Whereas in 1950 the 25–64 age group contained 153 women to every 10 men, in 2030, the ratio would be only 27 women to every 10 men;

(d) *Inactive old people*. In the case of women, these are people who are inactive in terms of production. Some of them, of course, are active in terms of retirement.

The figures given in the second part of table 30 show

[22] Some retirement schemes permit such early retirement.

the trends of change in the various categories of inactive people. The number of pre-school-age children follows the fertility trend and declines sharply, particularly between 1970 and 2000, as the following table shows:

	1950	1970	2000	2030
Children aged 0–4 years per 1,000 active population..............	209	189	112	88
	100	90	54	42

The population attending school also declines, but to a lesser extent than the pre-school-age population because of the prolongation of schooling:

	1950	1970	2000	2030
Persons attending school per 1,000 working population...........	490	502	357	310
	100	102	73	63

Lastly, there is the number of old people, which cannot be seen directly from table 30. It includes inactive persons aged 65 years and over, plus inactive men between the ages of 25 and 64, and minus women aged 65 and over who are inactive in terms of production

TABLE 28. MALE ECONOMICALLY ACTIVE POPULATION, BY AGE GROUP, EUROPE, 1950–2030

Age group (years)	1950	1970	2000	2030
	A. *Absolute numbers (thousands)*			
10–14................	739	733	99	
15–19................	11,138	10,833	5,628	2,111
20–24................	14,120	15,682	12,364	8,015
25–44................	50,948	59,464	72,425	50,487
45–54................	22,135	22,240	31,843	26,513
55–64................	13,382	18,660	20,182	23,057
65 and over..........	6,854	5,574	4,230	1,757
TOTAL	119,316	133,186	146,771	111,940
	B. *Age distribution*			
10–14................	62	55	7	0
15–19................	933	813	383	189
20–24................	1,183	1,177	842	716
25–44................	4,270	4,465	4,935	4,510
45–54................	1,855	1,670	2,170	2,369
55–64................	1,122	1,401	1,375	2,060
65 and over..........	575	419	288	156
TOTAL	10,000	10,000	10,000	10,000
Under 45..............	6,448	6,510	6,167	5,415
45 and over...........	3,552	3,490	3,833	4,585
TOTAL	10,000	10,000	10,000	10,000
Under 45..............	1,815	1,865	1,609	1,181
45 and over...........	1,000	1,000	1,000	1,000

TABLE 29. FEMALE ECONOMICALLY ACTIVE POPULATION IN EUROPE, 1950–2030

Age group (in years)	1950	1970	2000	2030
	A. *Absolute numbers (thousands)*			
10–14................	431	461	82	
15–19................	7,673	8,190	4,214	1,520
20–24................	8,976	10,145	9,446	7,918
25–44................	19,196	27,354	38,669	39,864
45–54................	7,814	11,609	19,425	21,536
55–64................	4,609	8,271	9,668	13,344
65 and over..........	2,057	2,695	2,465	2,162
TOTAL	50,756	68,725	83,969	86,344
	B. *Age distribution*			
10–14................	85	67	10	
15–19................	1,512	1,192	502	176
20–24................	1,768	1,476	1,125	917
25–44................	3,782	3,980	4,605	4,617
45–54................	1,540	1,689	2,313	2,494
55–64................	908	1,204	1,151	1,546
65 and over..........	405	392	294	250
ALL AGES	10,000	10,000	10,000	10,000
Under 45..............	7,147	6,715	6,242	5,710
45 and over...........	2,853	3,285	3,758	4,290
TOTAL	10,000	10,000	10,000	10,000
Under 45..............	2,505	2,044	1,661	1,331
45 and over...........	1,000	1,000	1,000	1,000

but active in term of retirement. The computation is shown in the last line of the table:

	1950	1970	2000	2030
Number of retired persons per 1,000 working population......	136	225	330	535
	100	165	243	393

The development of the total inactive population is as follows:

	1950	1970	2000	2030
Pre-school.....................	209	189	112	88
Attending school................	490	512	357	310
Retir d........................	136	225	330	535
TOTAL	835	916	799	933

It will be seen that an appreciable decline from 1970 to 2000 is followed by an increase of about the same magnitude between 2000 and 2030, so that the figure for 2030 is slightly above that for 1970.

The three groups are actually different in nature, and it is somewhat artificial to add them together. The pre-school-age population is supported mostly by the family, since children's allowances represent only a modest portion of family income, most of which still consists of the earnings of members of the family.

The population attending school is supported partially by the family, but also to a considerable extent by the State. In most European countries, the State pays a very large share of the costs of education.

The retired population is supported by the community, but under widely varying conditions and, it must be said, very meagrely.

The various systems for pension payments

No economy, capitalist or socialist, has ever really solved the problem of inactive old age. There are systems which are satisfactory in theory but which prove to be inadequate in practice. It is, in fact, more a problem of channels for the distribution of money than of availability of consumer goods. In any market economy, it is necessary to organize not only the production of goods and services, but the channels for the distribution of money. Otherwise, the market cannot function.

An individual has only three ways of obtaining money:

(a) As a return on capital (only in capitalist countries);

(b) As remuneration for work (wages, fees etc.);

(c) By payments from a collective fund in accordance with certain rights recognized by law, the collective fund being fed from fiscal or quasi-fiscal levies.

The first method is limited. If one accepts that capital represents roughly five times the national production and that the interest rate on money is of the order of 3 per cent (real rate, corrected for inflation), only 5 × 3 = 15 per cent of the national income can be distributed in that manner. Even if retired persons owned all the capital, it would be impossible to dis-

74

TABLE 30. INACTIVE POPULATION IN EUROPE, BY SEX, 1950–2030

Age group (years)	1950			1970			2000			2030		
	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total

A. Absolute numbers (thousands)

Age group (years)	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
Inactive population												
0–4	18,179	17,397	35,576	19,279	18,820	38,099	13,122	12,636	25,758	8,868	8,446	17,314
5–24	37,571	45,823	83,394	48,032	53,301	101,333	40,229	42,148	82,377	31,257	30,256	61,513
25–64	4,703	71,942	76,645	7,050	66,577	73,627	10,659	66,860	77,519	13,960	37,161	51,121
65 and over	7,728	17,529	25,257	15,541	28,530	44,071	28,819	40,789	69,608	42,160	51,890	94,050
ALL AGES	68,181	152,691	220,872	89,902	167,228	257,130	92,829	162,433	255,262	96,245	127,753	223,998
Active population: all ages	...	...	170,072	...	...	201,899	...	...	230,740	...	...	198,284
Total population: all ages	...	...	390,944	...	...	459,029	...	...	486,002	...	...	422,282
Active female population [a]	...	6,854	...	...	5,574	...	...	4,230	...	...	1,757	...

B. Proportion per 1,000 active population

Age group (years)	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
Inactive population												
0–4	107	102	209	96	93	189	57	55	112	45	43	88
5–24	221	269	490	238	264	502	174	183	357	158	152	310
25–64	28	423	451	35	330	365	46	290	336	70	188	258
65 and over	45	103	148	77	141	218	125	177	302	213	261	474
ALL AGES	401	897	1,298	446	828	1,274	402	705	1,107	486	644	1,130
Active population: all ages	...	...	1,000	...	...	1,000	...	...	1,000	...	...	1,000
Total population: all ages	...	...	2,299	...	...	2,274	...	...	2,107	...	...	2,130
Active female population [a]	...	40	...	...	28	...	...	18	...	...	9	...
Old people per 1,000 active population	148 + 28 − 40 = 136			218 + 35 − 28 = 225			302 + 46 − 18 = 330			474 + 70 − 9 = 535		

[a] Refers to active women in terms of retirement. They are the wives of active men aged 65 and over (table 28). It was assumed that all the men were married. This is, therefore, a rough estimate.

tribute to them the money they needed once their number exceeded 150 per 1,000 gainful workers. Yet, as has been shown above, the proportion will be more than three times as great.

The second method, remuneration for work, is the most common. It covers the needs of households so long as the head of the household and some of its members are engaged in gainful occupation. That is how the portion of educational and pre-school costs borne by the family is paid. But it does not apply to the part of those costs paid by the State. It is therefore necessary to resort to the third method, namely, financing through taxation. The same is true with respect to persons who have retired. Aside from the small portions of money distributed as a return on capital, the only way they can get money is through payments from a collective fund. That is, in fact, what happens, and various systems have been devised to constitute a fund or funds for the payment of pensions to beneficiaries.

The simplest system is to have funds fed by contributions from the active population and to distribute annually to the inactive population the amounts thus collected. This is known as the distribution system. The full impact of the indexes given above for the pension burden then falls on contributions, and in Europe, contributions in the year 2030 would be four times higher than in 1950.

Other systems have been devised in which the burden is divided in two. One part comes from the contributions by the economically active population, and the other part is incorporated in the prices of goods and services. The consumer pays the latter part without realizing it, as in the case of all other indirect taxes. In this way, the portion directly borne by the economically active population has been decreased, and this can be psychologically advantageous. However, tying the system to prices introduces the inflation factor, which may destroy the system if inflation is high.

Whatever system is adopted, society must make a choice. In fact, experience has shown that society has made a choice; as indicated earlier, society has done more than watch the increase in the proportion of old people which would have resulted from the effect of demographic factors alone. It has "consumed" part of the increase in productivity in order to shorten the number of years people must work during their lives.

It is interesting to see how the two phenomena have operated.

Aging of the population and social progress

Table 31, illustrated by figure XI, gives a breakdown of the effects of the various factors on the pensions burden. The table is explained below with respect to developments between 1950 and 1970.

In 1950, the ratio of the inactive population to the active population was 136:1,000. If activity rates had remained constant, in 1970 the ratio would have been 178:1,000. It can be said that demographic factors alone increased the proportion by 42 per 1,000 active population.

If, in 1970, the only other factor operating, aside from the demographic factor, had been advancement of the retirement age—to the exclusion of the other two factors which modify economic activity, namely, the prolongation of schooling and the increased participation of women in economic activity—there would have been 238 inactive old people per 1,000 active population. Advancement of the retirement age therefore increased the proportion by $238 - 178 = 60$ per 1,000 active population, that is to say, more than the demographic factor.

The prolongation of schooling, by reducing the numbers of the economically active population, indirectly increases the proportion of old people. Thus, the figure goes from 238 to 242, an increase of 4 per 1,000 active population.

The increased participation of women in economic activity has the opposite effect. By increasing the economically active population, it indirectly lessens the pensions burden. Thus, the figure decreases from 242 to 226, a drop of 16 per 1,000 active population.

Table 31 shows the great effect of the social progress, represented by advancement of the retirement age, in the first two periods, 1950–1970 and 1970–2000. Its effects exceed those of demographic factors alone.
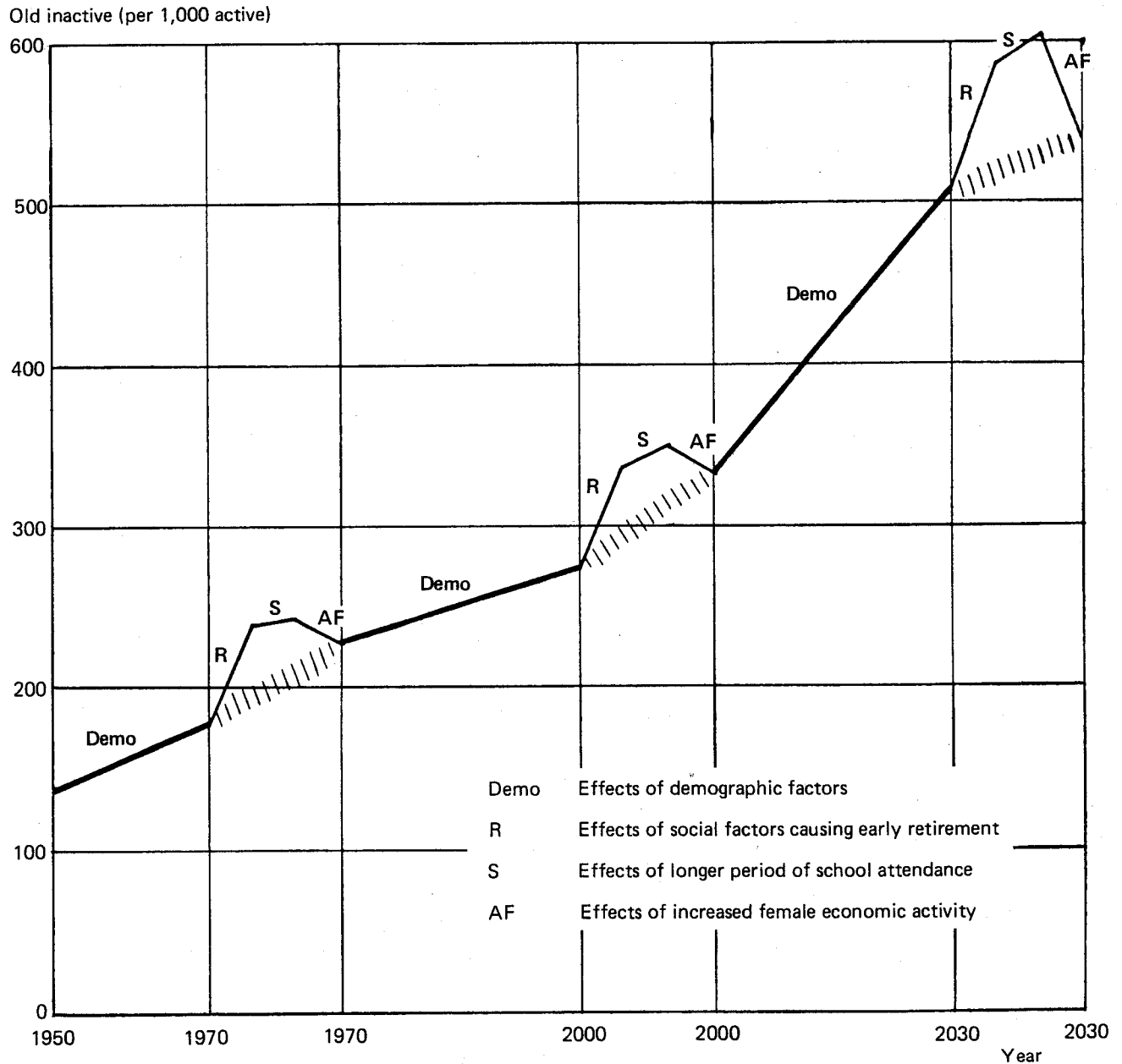
The period 2000–2030 has special characteristics. First, the effect of demographic factors will become very great, as a result of the marked aging of the population. Social progress will then take second place, but its effect will still be considerable.

The other special characteristic will be the effect of the increased participation of women in economic activity. By substantially increasing the economically ac-

TABLE 31. EFFECTS OF VARIOUS FACTORS ON THE NUMBER OF RETIRED PERSONS IN EUROPE

(*Inactive old people per 1,000 active population*)

Factors	1950–1970		1970–2000		2000–2030	
	Number	Increase	Number	Increase	Number	Increase
Number at beginning of period......	136		226		330	
Number at end of period resulting from effect of demographic factors..	178	42	273	47	505	175
Effect of early retirement............	238	60	336	63	587	82
Effect of prolongation of schooling...	242	4	349	13	603	16
Effect of increased participation of women in economic activity.......	226	−16	330	−19	536	−67

Figure XI. Trend in the proportion of economically inactive old people (number of economically inactive old people per 1,000 economically active), Europe, 1950-2030

Old inactive (per 1,000 active)

Demo   Effects of demographic factors

R   Effects of social factors causing early retirement

S   Effects of longer period of school attendance

AF   Effects of increased female economic activity

tive population, this increased participation will greatly lighten the pension burden.

Objectors to social progress

Not everyone has welcomed this "social progress". It has brought forth some "objectors" because the lowering of the retirement age has been applied rigidly. Accordingly, some people are forced to stop working even though they would like to continue, and others who could justifiably have been retired because of ill health are forced to go on working. In order to describe the trend in economic activity by age over time, table 19 on activity rates would have to be supplemented by another table giving figures for "objectors". If that table were combined with the table on the age structure (table 17), new light would be cast on the economic activity of the elderly. Unfortunately, although much information on activity rates is available from censuses, very little is known about the "objection" rates. It is certain that these rates vary according to age: among workers, they probably peak between ages 60 and 64 and among retired persons between ages 65 and 69. However, practically nothing is known about how high these peaks are.

Demographic analysis provides some details concerning these "objectors" to the trend in rates of economic activity over time. In some countries, age-specific death rates by occupation have been calculated, which reveal considerable differences. In France, for example, life expectancy at age 60 can range from 10 to 20 years, depending upon whether the person is a manual worker in industry or a teacher. This does not mean that manual workers should retire 10 years earlier than teachers. It does mean that, under a system with a mandatory retirement age of 60, the proportion of people who ought to retire before the age of 60 for health reasons would be much higher among manual workers than among teachers. Under such a system, the proportion of the working population who are "objectors" would be much higher among manual workers than among teachers, and the reverse would be true among retired persons.

A comparison of table 17, which gives the trend of the age structure, with the table of "objectors"—which has yet to be drawn up since the data are not available—may lead to the conclusion that by the year 2030 the proportion of "objectors" will greatly increase.

It would therefore be very useful to have detailed data on cessation and continuation of economic activity among the elderly. Accurate data would be needed on the rules governing retirement and the obstacles to the continuation of economic activity beyond a certain age. The purpose of such research would be to measure the proportion of "objectors" to social progress at various ages in order to promote a policy designed to eliminate this dissatisfaction, which generates social tension.

The nature of economic activity

These changes in activity rates are accompanied by important changes in the nature of economic activity, and it is often difficult to distinguish between cause and effect. An economy is traditionally divided into three major sectors:

(a) The primary sector, represented mainly by agricultural activities;

(b) The secondary sector, represented by activities relating to the production of consumer goods other than agricultural products;

(c) The tertiary sector, represented by services.

Technological progress has caused a shift from the primary to the secondary and from the secondary to the tertiary sector. The agricultural sector, which used to be the largest by far, has shrunk steadily since industrialization began, while services have increased enormously. This shift in itself has caused a change in over-all activity rates in the upper age brackets, since a person's working life is shorter in the services sector than it is in secondary and, above all, in primary occupations. These changes in the nature of economic activity are, therefore, the result mainly of technical progress, but social and psychological factors also contribute. A country's economically active population is the product of various forces.

The first factor to be taken into consideration is the training provided by the educational machinery. A given educational machinery cannot produce a working population capable of anything and everything. The die is cast, at least in part, when a student leaves school or university.

Secondly, that training obviously depends upon the opportunities available at a school, but it also depends upon how the population utilizes those opportunities. In order to have electronic engineers, it is not enough to establish schools of electronics; there have to be students. Everything will therefore depend upon the guidance parents choose to give their children.

It is the interaction of those two factors—available opportunities and how they are utilized—that will create a range of possible working populations.

Thirdly, the actual working population within that range will then be determined by the requirements of the economy.

Those requirements may or may not be absolute. At any given time, it would probably not be difficult to obtain a consensus on what ought to be done in order for society to function smoothly. Those desired goals can be translated in terms of a working population. Usually, such a working population will be outside the range determined by the educational machinery and by the use made of that machinery. In order to come within that range, some desired goals must then be discarded.

If an economy is to develop harmoniously, the discrepancies between all those working populations must obviously not be too great. Otherwise, tensions will arise. One may wonder whether that has occurred in Europe. The outright inflation of tertiary activities suggests that Europe wants to consume what it does not wish to produce. In other words, there is a discrepancy between the kind of working population that is needed

to produce the goods wanted for consumption and the kind of working population that reflects the willingness of individuals who wish to engage in this or that occupation. Therein lie the seeds of constant dissatisfaction.

The countries of Europe have found two ways of remedying this situation:

(a) They resort to foreign immigration. A foreigner's main qualification is that he is prepared to do any kind of work, at least in the short run. However, this willingness is very short-lived. The foreigner is very quickly infected with the virus of the tertiary sector;

(b) They employ female labour. Working women often see themselves as working temporarily to bring in an additional income. They therefore agree to do work which they would not accept if it was to be a lifelong occupation.

All these analyses of how an economically active population is created would be very useful for economic planning and for gaining a better understanding of the social tensions which arise from the training provided by schools and the choice of occupation. Very few adults realize that their desires as consumers are at variance with their desire for employment. Simple awareness of this divergence would eliminate much dissatisfaction. Very few demographers and even fewer economists have tackled these problems. There is much virgin territory here for demographic and economic research.

Urbanization

The shift from primary activities to tertiary activities has resulted in a movement of population which leads to urbanization. This movement is measured by calculating the rate of urbanization, defined as the proportion of the population living in "cities". The notion of "city" varies from country to country, and this makes comparisons between countries difficult. In view of the cultural similarities among European countries, however, the criteria adopted by the various countries to define an urban life-style may be accepted as reflecting similar realities.

Table 32 gives the proportion of the "urban" population, as defined by the national censuses in the countries of Europe and in the Soviet Union from 1950 to 1970. Canada and the United States of America have been added.

The development of the urbanization rate does appear to follow a logistic curve. At the beginning, when the country is almost exclusively agricultural, there are few people in the cities, perhaps from 5 to 10 per cent. When urbanization begins, the movement starts slowly, then accelerates and ultimately slows. In theory, there is nothing to prevent the complete disappearance of the rural population and the urbanization of the entire population. However, that appears to be unlikely. It seems that there will always be part of the population that wishes to remain rural. In the United Kingdom, the urbanization rate has levelled off at about 80 per cent for the past 20 years; and in no country listed in

TABLE 32. PERCENTAGE OF "URBAN" POPULATION IN THE COUNTRIES OF EUROPE, THE UNION OF SOVIET SOCIALIST REPUBLICS, CANADA AND THE UNITED STATES OF AMERICA, 1950–1970

Region or country	1950	1960	1970
Eastern Europe			
Bulgaria	27.9	36.8	51.5
Czechoslovakia	51.2	47.5	52.2
German Democratic Republic	76.8	72.2	81.2
Hungary	37.0	39.8	46.8
Poland	39.9	47.2	51.0
Romania	25.9	32.0	41.7
Northern Europe			
Denmark	67.2	74.0	80.3
Finland	31.8	55.5	60.7
Ireland	...	...	46.9
Norway	32.0	48.5	42.5
Sweden	47.1	72.4	79.6
United Kingdom	80.5	78.5	80.7
Western Europe			
Austria	49.1	49.9	53.9
Belgium	63.4	66.0	69.3
France	54.4	61.2	69.9
Germany, Federal Republic of	70.9	76.4	81.9
Netherlands	...	80.0	81.0
Switzerland	36.3	51.2	58.4
Southern Europe			
Albania			37.5
Italy	42.0	47.4	53.0
Greece	36.3	42.7	48.5
Portugal	31.2	33.8	37.2
Spain	51.6	56.1	60.9
Yugoslavia	17.1	27.8	36.0
USSR	39.6	49.4	57.1
Canada	62.0	70.0	76.3
United States of America	64.1	70.0	74.1
Europe	53	58	64

SOURCES: For 1950 and 1960, *Growth of the World's Urban and Rural Population*, 1920–2000 (United Nations publication, Sales No. E.69.XIII.3), annex IV, p. 115, table 44; for 1970, *Population and Vital Statistics Reports*, Statistical Papers, series A, vol. XXVI, No. 1 (ST/ESA/SAT/SER.A/107).

table 32 has it gone much beyond 80 per cent. One might be inclined to accept 85 per cent as a maximum.

In the light of these explanations, figure XII shows how the urbanization rate might develop in Europe up to the year 2030. The progression would be as follows:

Year	Percentage	Year	Percentage
1920	46	1980	70
1930	49	1990	75
1940	53	2000	79
1950	53	2010	82
1960	58	2020	84
1970	64	2030	85

SOURCE: Estimates for 1920, 1930 and 1940 have been taken from *Growth of the World's Urban and Rural Population, 1920–2000*, (United Nations publication, Sales No. E.69.XIII.3), p. 49, table 24.

By applying these percentages to the total population in table 16, one obtains the development of the urban and rural population in Europe from 1920 to 2030. The results are shown in table 33. It can be seen that the urban population peaks in 2010, whereas the peak for the total population is reached 20 years earlier, in

Figure XII. Urbanization in Europe, 1850-2000
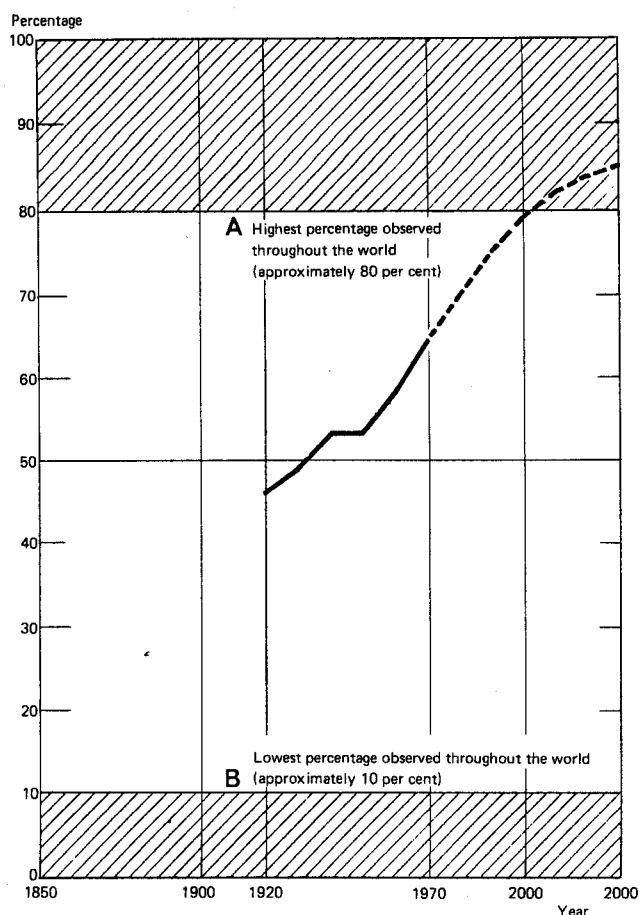*(Urban population as percentage of total population)*

Percentage

- A Highest percentage observed throughout the world (approximately 80 per cent)
- B Lowest percentage observed throughout the world (approximately 10 per cent)

1850 1900 1920 1970 2000 2000
Year

TABLE 33. URBAN, RURAL AND TOTAL POPULATION OF EUROPE, 1920–2030

(Thousands)

Year	Urban population	Rural population	Total population
1920	149,039	174,959	323,998
1930	173,005	180,067	353,072
1940	200,304	177,629	377,933
1950	207,184	183,730	390,914
1960	245,610	177,855	423,465
1970	293,778	165,250	459,028
1980	336,109	144,046	480,155
1990	364,586	121,528	486,114
2000	383,948	102,062	486,010
2010	388,385	85,245	473,640
2020	379,710	72,326	452,036
2030	358,940	63,342	422,282

1990. The rural population, after remaining fairly steady from 1920 to 1960, began to decline between 1960 and 1970.

Hospitalization requirements

Consideration will now be given to another phenomenon which varies according to age, namely, morbidity. The average annual number of days of hospitalization

is used as an index. This figure is not as well known as activity rates. The curve of variation according to age shows the same pattern as the curve of probabilities of death. It passes through a minimum at about the age of 20 years and rises sharply at advanced ages. Observations made during the 1970s in France are recorded [23] in table 34. Other countries provide very similar figures.

TABLE 34. AVERAGE NUMBER OF DAYS OF HOSPITALIZATION PER ANNUM, BY SEX AND AGE GROUP, EUROPE

Age group (years)	Male	Female
0–4	2.2	1.8
5–9	1.0	0.8
10–14	1.0	0.8
15–19	1.0	0.8
20–24	1.1	0.9
25–29	1.2	1.0
30–34	1.4	1.1
35–39	1.6	1.2
40–44	1.9	1.6
45–49	2.2	1.7
50–54	2.5	1.8
55–59	2.8	2.1
60–64	3.1	2.4
65–69	3.3	2.8
70–74	3.7	3.2
75 and over	5.0	4.6

SOURCE: Survey by Centre de recherches et de documentation sur la consommation, Paris.

Although the present situation is fairly well known, not much is known about the variations in the hospitalization curve over the years. Medical progress and the development of medical techniques probably modify the curve, but it is not known in what way; the same curve, that of table 34, will therefore simply be applied to the age distribution of the European population from 1950 to 2030. Table 35 gives the results. The number of days of hospitalization annually per 10,000 population increases from 16,754 in 1950 to 22,071 in 2030, an increase of 31.7 per cent.

On the assumption that a hospital bed may be in use 300 days per year, the number of beds required would increase from 56 to 74 per 10,000 population.

A calculation of the number of inhabitants per bed shows 179 for 1950 and 136 for 2030. Table 36 gives the number of inhabitants per bed for the various European countries at a recent date. In most cases, the figures are lower than those indicated for 1950 and 2030, reflecting the fact that Europe is well supplied with hospital facilities.

Table 35 shows a considerable aging of the hospitalized population between 1950 and 2030. Figure XIII illustrates the trend. Up to 65 years of age, males outnumber females, but the reverse occurs after 65. However, this preponderance of women after 65 years of age diminishes over the years (table 37).

Lumping together all days of hospitalization disregards the fact that those days probably do not cost the

[23] For women, days of hospitalization in connexion with confinement are excluded.

80

TABLE 35. NUMBER OF DAYS OF HOSPITALIZATION PER ANNUM IN EUROPE, BY AGE GROUP, 1950, 1970, 2000 AND 2030

(Per 1,000 population; both sexes)

Age group (years)	1950				1970			
	Male	Female	Total	Percentage	Male	Female	Total	Percentage
0–4.....................	1,023	801	1,824	10.9	935	729	1,664	9.5
5–24....................	1,665	1,327	2,992	17.9	1,681	1,294	2,975	17.0
25–44...................	2,042	1,814	3,856	23.0	2,013	1,613	3,626	20.8
45–54...................	1,392	1,160	2,552	15.2	1,189	1,007	2,196	12.6
55–64...................	1,170	1,134	2,304	13.0	1,472	1,322	2,794	16.0
65 and over.............	1,466	1,760	3,226	19.2	1,786	2,433	4,219	24.1
ALL AGES	8,758	7,996	16,754	100.0	9,076	8,398	17,474	100.0

Age group (years)	2000				2030			
	Male	Female	Total	Percentage	Male	Female	Total	Percentage
0–4.....................	605	472	1,077	5.6	462	360	822	3.8
5–24....................	1,226	947	2,173	11.3	1,009	777	1,786	8.2
25–44...................	2,336	1,826	4,162	21.7	1,901	1,466	3,367	15.5
45–54...................	1,649	1,245	2,894	15.1	1,614	1,184	2,798	12.8
55–64...................	1,624	1,307	2,931	15.3	2,295	1,775	4,070	18.7
65 and over.............	2,717	3,241	5,958	31.0	4,232	4,696	8,928	41.0
ALL AGES	10,157	8,038	19,195	100.0	11,513	10,258	21,771	100.0

TABLE 36. POPULATION PER HOSPITAL BED IN COUNTRIES OF EUROPE, *circa* 1970

	Year	Population per bed
Eastern Europe		
Bulgaria........................	1971	126
Czechoslovakia..................	1971	99
German Democratic Republic......	1971	85
Hungary........................	1971	123
Poland.........................	1971	130
Romania........................	1971	118
Northern Europe		
Denmark........................	1968	109
Finland........................	1970	78
Ireland........................	1970	80
Norway.........................	1970	89
Sweden.........................	1970	67
United Kingdom.................	1970	107 a
Western Europe		
Austria........................	1971	92
Belgium........................	1970	120
France.........................	1970	139 a
Germany, Federal Republic of......	1970	87
Netherlands....................	1970	190
Switzerland....................	1970	88
Southern Europe		
Albania........................	1969	164
Italy..........................	1965	95
Greece.........................	1971	157
Portugal.......................	1971	164
Spain..........................	1968	218
Yugoslavia.....................	1971	171
USSR..........................	1970	91

SOURCE: *Statistical Yearbook, 1972* (United Nations publication, Sales No. E/F.73.XVII.1), p. 749, table 202.

a Government establishments only (administered by a governmental authority at any level, whether central, intermediate or local).

Figure XIII. Age distribution of hospital patients, Europe, 1950-2030

same at all ages. The illnesses treated at the age of 70 are not the same as at the age of 20, and treatment at an advanced age is generally much more expensive than at an earlier age. Data are lacking for such a study.
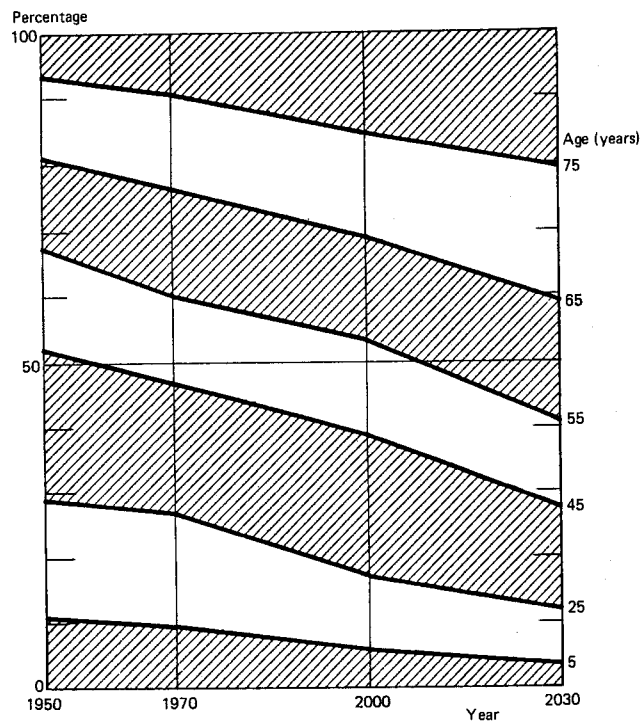
Consideration of the curve for deaths provides some interesting information.

The same mortality table has been applied to the age distribution of the European male population [24]

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[24] Similar results are obtained for the female population.

TABLE 37. NUMBER OF FEMALES HOSPITALIZED PER 1,000 MALES, BY AGE GROUP, EUROPE, 1950, 1970, 2000 and 2030

Age group (years)	1950	1970	2000	2030
0–4	78	78	78	78
5–24	80	77	77	77
25–44	89	80	78	77
45–54	83	85	76	73
55–65	97	90	80	77
65 and over	120	135	119	111

TABLE 38. AGE DISTRIBUTION OF MALE DEATHS IN EUROPE, ASSUMING CONSTANT MORTALITY, 1950–2030 [a]

Age group (years)	1950	1970	2000	2030
0–4	44	34	15	7
5–24	20	17	9	5
25–44	41	34	27	14
45–64	230	220	179	151
65 and over	665	695	770	823
Crude death rate (percentage)	6.6	7.7	11.0	17.0

SOURCE: Model life table, West, level 24, taken from Ansley J. Coale and Paul Demeny, *Regional Model Life Tables and Stable Populations* (Princeton, N. J., Princeton University Press, 1966).
[a] Expectation of life at birth 73.9 years.

from 1950 to 2030. The results are given in table 38. The following facts emerge:

(a) Death becomes increasingly a phenomenon of old age, and even of advanced old age. The percentage of deaths at 80 years and over increases from 22 per cent in 1950 to 37 per cent in 2030, solely as a result of aging of the population, since in table 38 mortality is assumed to remain constant from 1950 to 2030;

(b) The last line shows how greatly the crude death rate is affected by this aging of the population. It almost triples, while mortality remains constant.

This should not be taken to mean that the decline in mortality has little effect on the crude death rate. Figure XIV shows the results of applying the mortality table relating to the situation in 1950. The shaded area measures the effect of the decline in mortality on the crude death rate. The extent to which this decline delays the emergence of an excess of deaths can be seen.

Economic activity and inactivity, and hospitalization are the only two examples of phenomena varying according to age that are dealt with in this analysis. Many other phenomena varying according to age could be studied in the same way, including:

(a) Income and the use made of it (investment);

(b) Ownership and inheritance of capital;

(c) Medical consumption;

(d) Leisure consumption;

(e) Propensity to geographical mobility.

The main difficulty lies in understanding the variation curve of the phenomenon in relation to age. In the first example dealt with, namely, economic activity, much

Figure XIV. Crude death rate, Europe, 1950-2030

A   Male model life table; West, level 20[a]

B   Male model life table; West, level 24[b]

C   Observed rates for both sexes combined

D   Rates given by theoretical projection II for both sexes combined
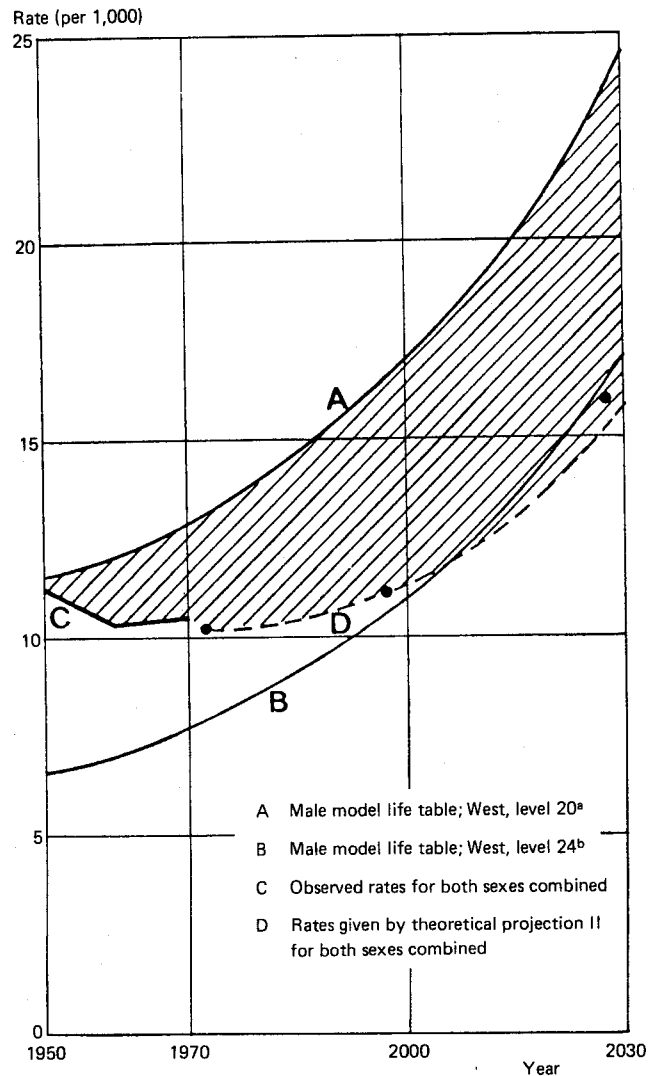
SOURCE: Model life tables taken from Ansley J. Coale and Paul Demeny, *Regional Model Life Tables and Stable Populations* (Princeton, N.J., Princeton University Press, 1966).
[a] Expectation of life at birth, 63.6 years.
[b] Expectation of life at birth, 73.9 years.

information was available. Not only was the curve in relation to age well known, but time series making it possible to extrapolate were available. In the case of hospitalization, the information was much less detailed and no time series were available. This limitation greatly reduced the possibilities of analysis. One of the first tasks would therefore be to compile a record of the economic and social phenomena which vary according to age, to determine those variations and, lastly, to attempt to compose time series. The existing documentation could be used at first (social security records, tax statistics, housing statistics etc.). It would then be necessary to carry out special surveys, but that endeavour would raise no particular problem.

82

The special case of goods and services consumed at the local level

When a capital good is used locally—in other words, when the user does not wish (or is unable) to go very far in order to "consume" the good offered to him—factors linked with the habitat come into play which are not dealt with in an over-all analysis of the type carried out above. However, these factors are so powerful that they overshadow the effects of changes in structure and of rates of variation.

The concentration of the population in cities, which makes it necessary to construct new districts, and the attachment of married couples to the dwellings they occupy—a more specifically European characteristic—are the two causes of the phenomena which are briefly discussed below.

In a paper [25] prepared recently by the Committee for International Co-ordination of National Research in Demography (CICRED), H. Le Bras and J. C. Chesnais study the relationship between demographic structures and habitat in urban districts. Only a small part of the paper is dealt with here; those interested in the question may refer to it for further details.

Le Bras devised a model describing the settlement of a new district or new town in the following way. Fertility and mortality are assumed to remain constant, and the combination of the two factors leads to a net reproduction rate equal to unity. Over the long term, any closed population subjected to such conditions becomes stationary. But the population in the Le Bras model is not closed.

The model relates to the settlement of a new district which, when completed, would have 25,000 dwelling units. Several alternative building schedules are considered: the 25,000 units may be constructed in 5, 10, 25 or 50 years. The units would be occupied exclusively by households composed—purely for the sake of simplification—of nuclear families, i.e., husband, wife and children. Children are assumed to remain with the family for three years after completing their schooling. The husband is assumed to be three years older than the wife. Lastly, again for the sake of simplification, mortality is assumed to be zero throughout the reproductive period. After the end of that period, mortality would begin to operate, households would gradually lose their nuclear form and their would be widows and widowers.

Taking as a basis the male adult immigrants (25 years and over) to a new town, Cergy, in the Paris area, the foregoing assumptions were applied in order to determine the corresponding female population and the population under 25 years of age still in the households. The results obtained are very close to the female population and the population under 25 years of age actually observed at Cergy. This concurrence shows that the model chosen corresponds quite well to the settlement of a new town.

Each year, 5,000, 2,500, 1,000 or 500 households are added, according to whether settlement takes place over a period of 5, 10, 25 or 50 years, and the population ages and remains immobile.

A very important final assumption is made, namely, that each married couple remains immobile as it ages—in other words, it retains its dwelling unit until the last survivor of the couple dies.

At the outset all goes well. But problems then arise: "Couples remain where they are as they age, children reaching adult age leave because they can no longer find accommodation locally, the population declines and ages. . . . After extreme aging, many dwelling units become available for occupation and the population rejuvenates and increases." [26]

Table 39 shows the development of the total population. The variations are sizable. They are even larger if one takes certain particular groups of the population.

TABLE 39. SETTLEMENT OF NEW DISTRICTS

Population and size of household	Settlement over a period of:			
	5 years	10 years	25 years	50 years
On completion of the town				
Population	85,000	85,000	75,000	65,000
Size of household	3.4	3.4	3.0	2.6
30 years later	50,000	50,000	50,000	55,000
	2.0	2.0	2.0	2.2
60 years later	65,000	65,000	65,000	55,000
	2.6	2.6	2.6	2.2

Figure XV shows the development of the school-age population.[27] At first, there are many children, and hence a need for many schools. Then the schools empty almost completely. In the case of settlement over a 10-year period, there are 25,000 pupils after 10 years; but 30 years later, there are scarcely 4,000. After another 30 years, the figure has swung back to 15,000, and so it goes on. It takes more than 100 years to reach an equilibrium.

In figure XVI, the left-hand side makes it possible to understand why such fluctuations are observed. It shows the extent to which the population pyramids are subject to irregular fluctuations. As the report states: "It is clear that the children of the first arrivals cannot settle locally. They are driven away, condemned to settle new towns from which their own children will in turn be expelled." [28]

Outright age segregation emerges, leading to social disruption. The final assumption adopted in the model, namely, that each married couple remains attached to its dwelling unit as long as one of the spouses survives, is obviously an extreme assumption. Le Bras has there-

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[25] "Structures demographiques et habitat dans les quartiers urbains" (A/CONF.70/RPC/BP/9), paper prepared for Habitat: United Nations Conference on Human Settlements, Vancouver, 31 May–11 June 1976.

[26] *Ibid.*, p. 30.
[27] Obtained by applying school enrolment rates to the population by age.
[28] A/CONF.70/RPC/BP/9, p. 47.

Figure XV. Trend in school population in a new district or new town

School population (thousands)

A Settlement completed in 10 years

B Settlement completed in 50 years
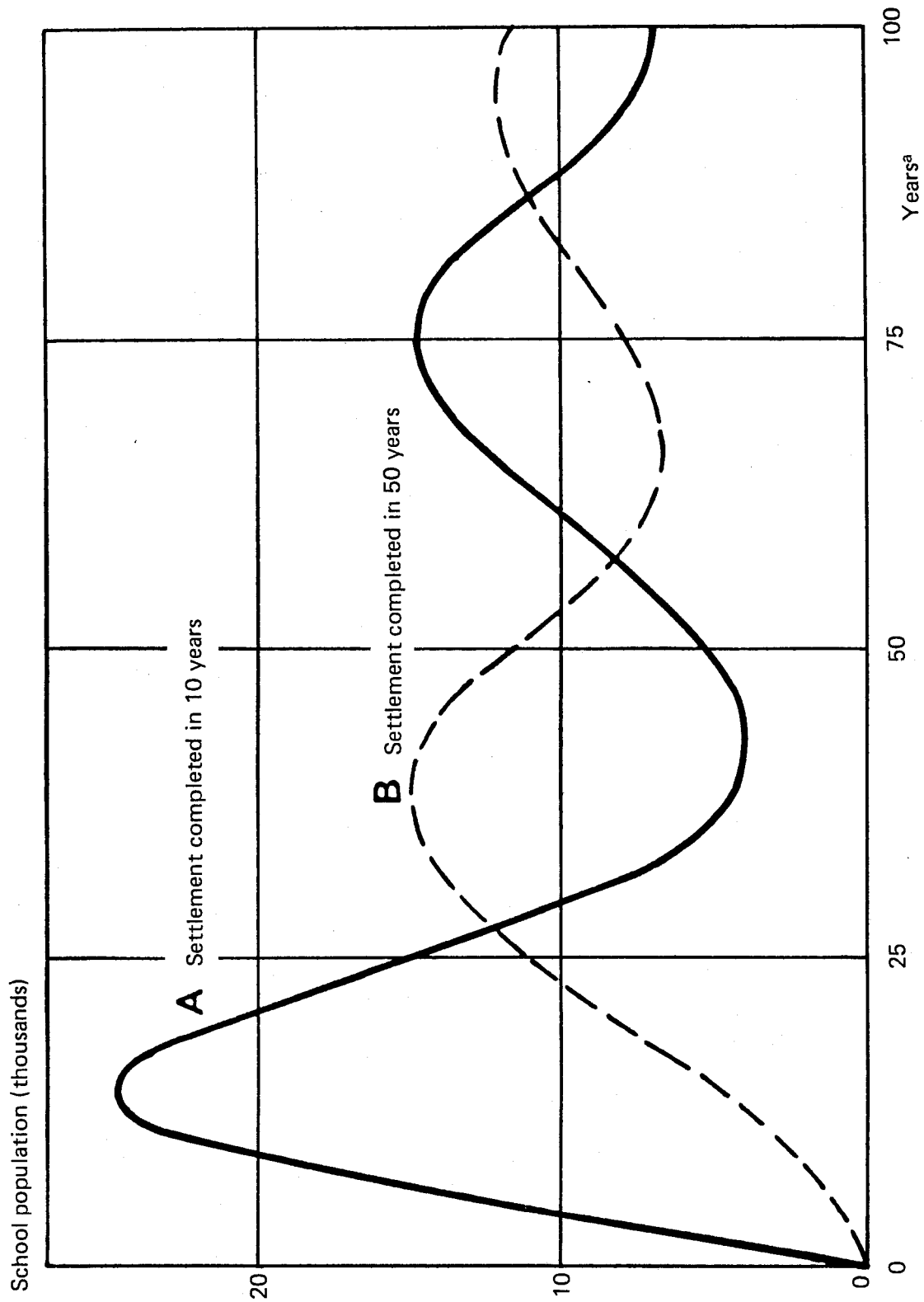
Years[a]

[a] Years after settlement begins.

84

Figure XVI. Age structure of the population of a new district or new town

Age pyramid 20 years after settlement begins

Age pyramid 50 years after settlement begins

Age pyramid 10 years after settlement begins
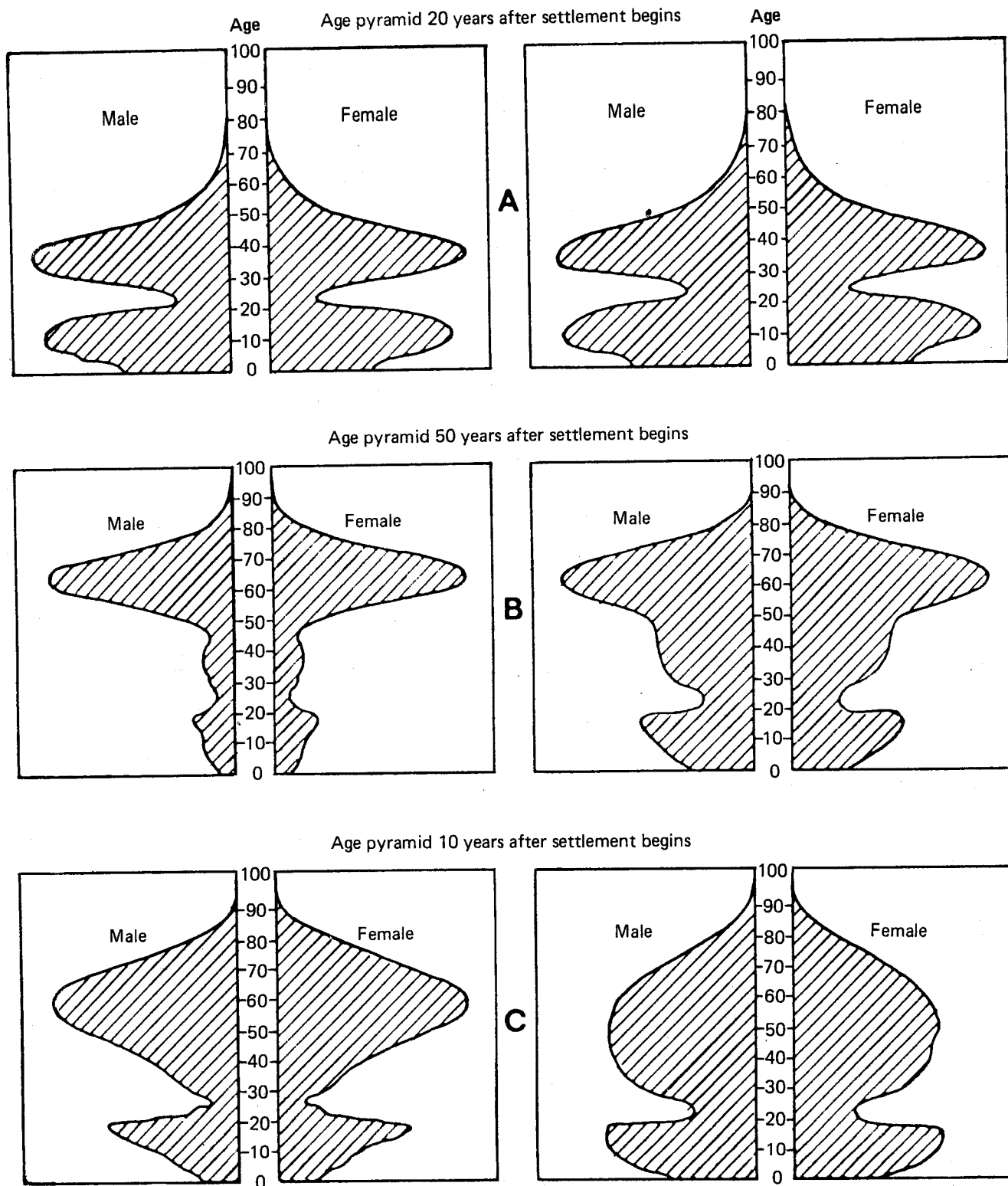
Notes: Left-hand pyramids: households remain in same home until death of surviving spouse.

Right-hand pyramids: households emigrate at same rate as population of towns of the same category

85

fore modified his model by assuming that, once they have moved into the new district or new town, couples would have the same migration rates as the population of towns in the category to which the new district or new town belongs. The irregular fluctuations are then reduced, but they are still very sizable, as is shown by the right-hand side of figure XVI.

In view of these irregular fluctuations, it is clear that the changes in age distribution which were considered in connexion with economic activity and hospitalization requirements become of secondary significance. Like all models, those composed by Le Bras do not profess to replace reality; they show the direction that research should take.

Conclusions

The completion of this analysis inevitably raises the thought that a new set of European population trends is emerging which may foreshadow the future trend in the entire world.

Once decisive advances were made in the area of contraception, sociologists began to wonder how man would handle total mastery of his reproductive activities. Surveys were immediately carried out in order to try to determine how many children were wanted and how many unwanted; and some 15 years ago, about 1960, people were surprised to learn that in the western world, half of all births were unwanted.[29] At the time, the crude birth rate was on the order of 18 per cent and the elimination of those unwanted births would have brought it down to 9 per cent. At the time, that appeared impossible; so low a crude birth rate was considered very unlikely in the human race. Now, however, one sees such low rates gradually emerging.

As was shown above, a crude birth rate of 9 per cent corresponds to roughly 1.5 children per woman. Is this the new couple norm; or does it indicate an era of wide swings in fertility, with 1.5 children per woman as a minimum and, for example, 2.5 children as a maximum? It is still too early to decide, but it should be borne in mind the fact that a completed fertility of 1.5 children per woman leads fairly quickly to a declining population, a situation that can create social pressures for higher fertility.

One of the recent lessons of fertility trends in Europe is the importance of group effects. Advances in contraception might have led one to believe that decisions on reproduction would in future be taken in accordance with the couple's personal feelings, instead of being, as in the past, determined by the cultural heritage of societies. In reality, couples appear to obey, probably unconsciously, general currents of opinion. What other explanation is there for the reversal of the fertility trend at the very same time in the countries of Europe and in most other countries? Certainly, the couple decides, but it does so on the basis of social criteria; the cultural

heritage which had been dismissed prematurely has reasserted itself.

The small number of children is not the only feature distinguishing the emerging new family from the old. The new family also appears to be slowly adopting a new structure. First, it is increasingly seldom "legitimate", and even when legitimate it is increasingly broken up by divorce. Certainly, there have always been illegitimate births and divorces, but they were relatively rare. Today, however, in a country like Sweden, these events are three times more frequent than they were 10 years ago. Abortion also is tending to become an everyday occurrence. Formerly, it was a traumatic event in the life of a family. Although it is still an emotional shock for the mother, it is now accepted by society.

This decline in fertility has consequences on the age structure of a population that are very familiar to demographers: the population vacillates around its median age and ends up with proportionally fewer young people and more old people. The effects of these changes on economic activity and inactivity are also well known. To them must be added the effects of social progress and cultural development.

The former "consumes" a share of technical progress by reducing the amount of time devoted to work. It thus increases the proportion of the economically inactive population. The latter, because of the expansion of education, produces an economically active population which is no longer suited to the wishes of consumers. The population wants to consume what it no longer wants to produce.

Consumption of technical progress by social progress has been very substantial so far. J. Fontanet, the French Minister of Labour, Employment and Population, described the process in striking terms at the Second European Demographic Conference in Strasbourg. Referring to France, he said:

"I shall start from the following fact: with the standard working hours prevailing in 1900 and the labour productivity of 1970, France would now produce 8.9 times more than at the start of the century. The parents of many of you were alive in 1900, which has been described as a *"belle époque"*. It is hard to believe that at that time France's production potential was one ninth of what it is today. A new world has emerged in the space of two generations.

"Nevertheless, very fortunately the 1900 standards have not survived. Daily working hours and the weekly number of work days have been reduced, as has the number of weeks worked per year. Accordingly, the ratio I just mentioned has fallen from 8.9 to 6.6.

"The number of years of work per lifetime has also been reduced: now people start work at a later age and they stop sooner than before. This reduces the number of people working at any given time. Our ratio thus falls to 4.8. Finally, France has more people in 1970 than it had in 1900—approximately 50

[29] See, for example, Henri Pigeaud, Hélène Bergues and Jean Sutter, "Attitudes devant la maternité" (survey conducted at Lyons), *Population*, No. 2 (1966), p. 240, table VIII.

million, as compared with 40 million—so that the *per capita* income has increased only 3.9 times.

"It is still a gratifying result, but remember that we started with a multiplier of 8.9! We have therefore 'consumed', in the broad sense of the term, part of the progress in order to improve our way of life, particularly by working less, and have then settled for a more modest increase in the goods and services produced by the economy." [30]

On the basis of the projection chosen for this analysis—or under the combined impact of aging of the population and social progress—the proportion of economically inactive per 10 economically active people would rise from 1 to 5 between 1950 and 2030. So far, social progress has outweighed the aging of the population, but the opposite will occur in the next 50 years. How are these old economically inactive people to be provided with a level of living comparable to that of the working population? That is one of the major problems which Europe will have to face in the future. It will probably be said that there have always been old people and that they have managed to exist somehow, usually badly. Here again, however, the same problem arises as in the case of families. Hitherto, old people were a relatively rare phenomenon. The situation changes drastically when the ratio of working to non-working population increases from 1 to 5.

Moreover, this social progress, while most desirable, continues to be too rigidly confined; it causes discontent among both the working and the non-working population.

The incompatibility—which is cultural in origin—between the kind of economically active population produced by the wishes of individuals exercising a profession and the type of economically active population required to meet the wants of consumers is the cause of tensions which may lead to major economic turmoil. Unemployment and inflation, the two evils besetting the modern world, are fuelled by them.[31] During periods of economic growth, the capitalist portion of Europe offsets the consequences of this incompatibility by using foreign workers who are prepared to work in occupations rejected by the citizens of the countries. In a socialist country, the centralized planning system, by definition, eliminates the problem, but not necessarily the tensions; there, no one does exactly what he would like and the goods produced are not exactly what people would like to consume, and all that obviously lowers labour productivity. If the two constraints are freely consented to, social tension will disappear, but the effect on productivity remains.

Moreover, not all problems can be solved by simply adjusting production to consumption. The goods and services produced must also be made easily available to the consumers.

Generally speaking, distribution circuits move the output to where the consumers are, but there are goods which can be consumed only at the place where the products are; in such cases the movement is on the consumer side. A typical example is schools; but there are others, such as hospitals, theatres, museums, amusement parks and, generally speaking, all community facilities. However, movement by consumers raises further problems. For example, a child cannot be asked to travel too far from home in order to attend school. Urbanization, which results in building new districts and even entire towns, combined with everyone's attachment to his home, may then, in time, give rise to distortions between the community facilities of new districts or new towns and the needs of their population.

It did not take a decline in fertility to demonstrate the effects of the two distortions mentioned above. An aging and shrinking population will accept them even less willingly.

This analysis has revealed several major themes for research. Four of them are discussed below.

The determinants of fertility are still a mystery. It is not known how public opinion forms a bias in favour of or against childbearing, and yet demographic forecasting can be improved only through better knowledge of these collective phenomena. It is difficult to isolate from the individual behaviour of couples the underlying collective influences whose exact nature is unknown and the revelation of which is expected to make them definable. Here is one area on which research is essential.

Little is known about the relationship between, on the one hand, the training and occupation which produce the economically active population desired by individuals and, on the other hand, the economic activity which produces an economically active population suited to the consumers' wants. A given training will serve a series of possible occupational structures. Similarly, a given consumption can be obtained through another set of occupational structures. Is there or is there not any common ground between the two? The prospects for balanced economic and social development depend upon the answer to that question. This is a second area of research which is of capital importance for Europe.

The distortion between needs and community facilities referred to above is a third area which has as yet barely been touched upon.

Lastly, something must be said about mortality. It might appear from this article that this factor has had very little influence on population trends in Europe. The facts might well prove that impression incorrect.

For roughly two centuries, steady progress has been made in the struggle against death. During that time, mankind has succeeded in eliminating "accidental" deaths in the broad sense of the word. Such deaths are sometimes described as exogenous, meaning that the lethal factor is external to the organism. Public health

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[30] Council of Europe, *Official Documents of the Second European Demographic Conference*, Strasbourg, 31 August–7 September 1971, vol. IV, p. 47.

[31] Alfred Sauvy, *L'économie du Diable—chômage et inflation* (Paris, Calmann-Lévy, 1976).

services, in all their forms, now make it increasingly possible to prevent encounters between the organism and the lethal factors; and if, in spite of everything, such an encounter should occur, methods have been discovered to minimize their consequences (vaccination) or combat their effects (medication). Little by little exogenous deaths have been eliminated and mortality has been reduced to endogenous deaths, the causes of which lie within the organism and appear to be related to the process of biological aging. It is known that the elimination of exogenous mortality results in a life expectancy at birth on the order of 80 years.

The struggle against endogenous mortality has not been very successful so far, but progress can be expected in the years to come. One may ask how far this struggle can go, and what the limit to endogenous mortality might be.

Obviously, the intention is not to make man immortal. A study of deaths attributed to old age sheds light on the possible limits to endogenous mortality. When the recording of causes of death began, many deaths were attributed to old age because doctors were often unable to identify the true cause. As a result of the efforts of the World Health Organization, the entry "old age" gradually lost all meaning; but there is still a small residue of cases which defy all efforts to establish the true cause of death. The rates corresponding to this residue give an idea as to the endogenous limit of mortality. There is no doubt that the greatest efforts to improve knowledge about the causes of death have been made in England and Wales. A life table based on deaths attributed to old age in 1973 yields an expectation of life at birth of 111 years. Accordingly, two phases must be distinguished in the decline in mortality. In the first phase, exogenous deaths disappear and expectation of life at birth increases from 25 to 80 years. In the second phase, endogenous deaths decline in turn; and expectation of life at birth increases from 80 to 111 years. The first phase is about to end in Europe, and the second phase is beginning. In the first phase, the decline in mortality had little effect on the age structure of the population and sizable effects on its net reproduction. The contrary will occur during the second phase. The decline in endogenous mortality will produce aging which will reinforce the aging of the population and the effects of social progress. Provision will then have to be made, not for five economically inactive persons for every 10 active persons, but, perhaps, for 10 of one group for every 10 of the other group. A new society will have to be invented. Any long-term demographic forecasting must include a study of the conditions of declining endogenous mortality. That topic, therefore, constitutes a fourth area of research which deserves high priority.

ON THE EVALUATION OF POPULATION AND EMPLOYMENT POLICY

R. *Wéry*, G. B. *Rodgers* and M. J. D. *Hopkins* *

A RESEARCH STRATEGY

It is becoming banal to talk of "population and development". Agreement is widespread that population policy should be treated as one element in development planning, rather than as an isolated and independent series of measures. There is, however, considerably less than a consensus as to how this admirable objective is to be attained. This article deals with one concrete means by which population policies can be introduced into the planning process, with particular reference to the planning of employment and income distribution: the discussion focuses on economic-demographic interrelationships. This chapter concerns the content of the Bachue series of economic-demographic planning models; in the second chapter, some examples are given of the use of these models in development planning.

Because of the complexity of the interrelationships between population and employment, it is argued here that an adequate analysis demands the specification of a general framework. At the minimum, such a general framework should provide the context within which partial analyses could be undertaken. Ideally, it should be able itself to constitute the basic instrument of analysis, quantitatively handling all relationships simultaneously or sequentially, and thus following changes in any one segment throughout the economic-demographic system. This implies the development of models covering economic, demographic and where possible social variables, integrated into a theoretical schema which attempts to represent the essentials of the interrelationships between economic and demographic variables in the real world.

Such an approach to economic and demographic relationships has been formalized in the construction, within the World Employment Programme of the International Labour Organişation (ILO), of the Bachue series of economic-demographic models.[1] The methodology that has been adopted can be considered to be a three-step process. The first step is to design a speculative or theoretical model for some hypothetical developing country; obviously, this step should not go too far, since as soon as the major structural relationships have been devised, generality is easily lost. The second step is to calibrate the model for one or several developing countries, to develop behavioural and structural relationships which are specific for each country concerned and to conduct a series of experiments examining the sensitivity of the model to changes in parameters or structure. The third step in this process is the implementation of each calibrated and tested country-level model in national planning frameworks, to be used for testing and evaluating ideas and policies. There will be some iteration between the second and third steps, because as new data, theories and doubts become available, the model can be revised or alternative structural forms investigated.

The prototype model in the Bachue series was Bachue-1, a first attempt to build a highly endogenous economic-demographic system; at the second step, models for the Philippines, Kenya, Brazil and Yugoslavia are completed or in progress; and the second step of the Philippine model is currently being completed. The following discussion reviews the basic structure of models in the Bachue series, drawing on results from the Philippine work for quantitative illustrations of the implications of this structure, with particular reference to the ways in which complex models of this type can go beyond simple, partial relationships.[2] As some aspects of this structure vary from country to country, it is not a single model that is described here; but, again, reference to specific formulations derives from the work on the Philippines.[3] The use of this series of models for policy purposes is investigated in the next chapter.

* World Employment Programme, International Labour Organisation, Geneva. The views expressed in this article are those of the authors and do not necessarily reflect those of the International Labour Organisation.

[1] For descriptions of the prototype model, Bachue-1, see R. Blandy and R. Wéry, "Population growth and employment: Bachue-1", *International Labour Review*, vol. 107, No. 5 (1973); International Labour Office, World Employment Programme, "Economic-demographic modelling activities of the World Employment Programme", Geneva, 1973 (mimeographed), paper presented to the International Population Conference of the International Union for the Scientific Study of Population,

Liège, 1973. For descriptions of a model for the Philippines, see G. B. Rodgers, M. J. D. Hopkins and R. Wéry, "Economic-demographic modelling for development planning: Bachue-Philippines", Geneva, International Labour Organisation, 1976.

[2] For further details on the work on Bachue-2, see Rodgers, Hopkins and Wéry, *op. cit.*

[3] Quantitative results given in this paper are illustrative. In interpreting them, reference should be made to the discussion on the use of models of the Bachue type. These models are not designed for prediction or projection, but as an experimental framework for policy simulation and evaluation. They do not claim to provide an accurate picture of the future, but rather to investigate future alternatives in relation to choices and decisions currently or in the future, or in relation to alternative theories of the development process.

The main linkages of Bachue-Philippines, shown below in the figure, give an idea of the content of these models. There are three major subsystems: (a) demographic, explaining fertility, migration and a number of other basic demographic variables in terms of the consequences of household decision making; (b) economic, determining final demand and output; and (c) labour and income, determining employment and the distribution of household income. Essentially, subsystems (b) and (c) together form a model of over-all economic development, weighted to emphasize the determination and effects of employment and income distribution, and focusing on the principal links between macro-economic and demographic variables. Thus, labour market behaviour is covered in some detail; on the other hand, the generation of output and investment, although necessarily in part endogenous, can optionally be treated as being in part the result of exogenous planning policy decisions.

The economic system of the Philippine model is a demand-based multisectoral model in a dualistic framework. Aggregate supply constraints are introduced, simply, by using planned targets for aggregate output and investment, which are determined exogenously. In the base run, both items grow at 7 per cent per annum, that figure being an extrapolation of current short-term planning in the Philippines. Alternatively, output can be determined endogenously, as a function of demand, in order to show more clearly the demand effects of demographic changes; in this way, the model can represent the empirically observed positive relationship between population growth and output growth, without relying on positive marginal productivity in a neo-classical production function. Evidently, there is scope for varying the assumptions on growth rate of output and investment, based partially on information extraneous to the model; however, the model itself also gives indications on the feasibility of any growth rate, in terms of balance of trade and payments, labour demand and so on. For instance, in the reference run,[4] the balance of trade is in surplus throughout the simulation period 1975–2000. However, if an 8 or 9 per cent growth rate of output were assumed without further export promotion or import substitution, the balance would rapidly become negative; and with 9 per cent, the deficit would be extremely large by 2000. Human resource constraints are not a bottle-neck, as in the year 2000 the 7 per cent run shows 45 per cent of the labour force still in the rural traditional sectors [5]—as compared with 57 per cent in the initial (1965) period—and skilled labour, defined on the basis of their educational qualifications, also abundant.

The model can reproduce a number of the main structural changes associated with the development pro-

cess, arising out of both economic and demographic causes. Shifts in production between sectors as a result of demand changes, changes in the location of economic activity between rural and urban areas and the development of labour market dualism are all generated endogenously. Intersectoral demand shifts come largely from changes in household expenditure patterns. Demographic factors have an important role here; for instance, for an (average) urban Philippine household income of 5,000 Philippine pesos (P) in 1965, expenditure on cereals for a small family (two adults, two children) was approximately 10 per cent of all expenditure; for a larger family (two adults, five children), it rose to 13 per cent. In general, larger families are associated with higher expenditure on food and clothing and with lower expenditure on housing and most other goods. This situation can have quite important implications for economic structure as economic and demographic development proceed alongside each other, intensifying the tendency for demand to become urban, rather than rural-oriented.

Structural change in the labour market is represented through the identification of "modern" and "traditional" sectors; the latter are lower-income sectors and absorb labour more readily. Here again, outcomes are due to a mix of economic and demographic factors, as labour supply, by location, is strongly influenced by population variables (size, age structure, fertility) as well as by various economic factors. Employment in the modern sectors, disaggregated by "skill" (educational level), depends upon the growth and structure of those sectors; the traditional sectors tend to absorb remaining labour supply, although if their relative wages fall, there is pressure on the modern sectors to increase their labour absorption. Although open unemployment is also incorporated in the model, its explanation is poor; in a dualistic economy, open unemployment is a social rather than an economic phenomenon. It arises primarily when people can support themselves outside the labour force, usually with the help of relatives, with a view to maximizing the value of the job ultimately accepted. Often, it arises from unwarranted labour market expectations deriving from the achievement of a certain educational level. Therefore, open unemployment is explained here in these terms rather than in terms of inadequate labour demand, and the concentration is on incomes and employment in the absorptive sectors as principal measures of the success of the economy in productively utilizing labour.

Another subsystem of the model generates educational levels and school enrolment. This submodel consists of a series of accounting identities describing the passage of demographic cohorts through the educational system. Enrolment and drop-out rates are exogenous and are taken to be the results of government policy measures; a fully articulated model, however, would also have to consider education to be one aspect of household decision making.

The macro-economic system interacts with a model based on micro relationships, covering the consequences

[4] That is, the run of the model with which policy changes are compared. It is designed to reflect unchanged general government policies and central estimates of unknown parameters (e.g., export growth).

[5] The assumption here is that food imports are minimal. With large food imports, the percentage, of course, declines, as migration out of agriculture is higher.
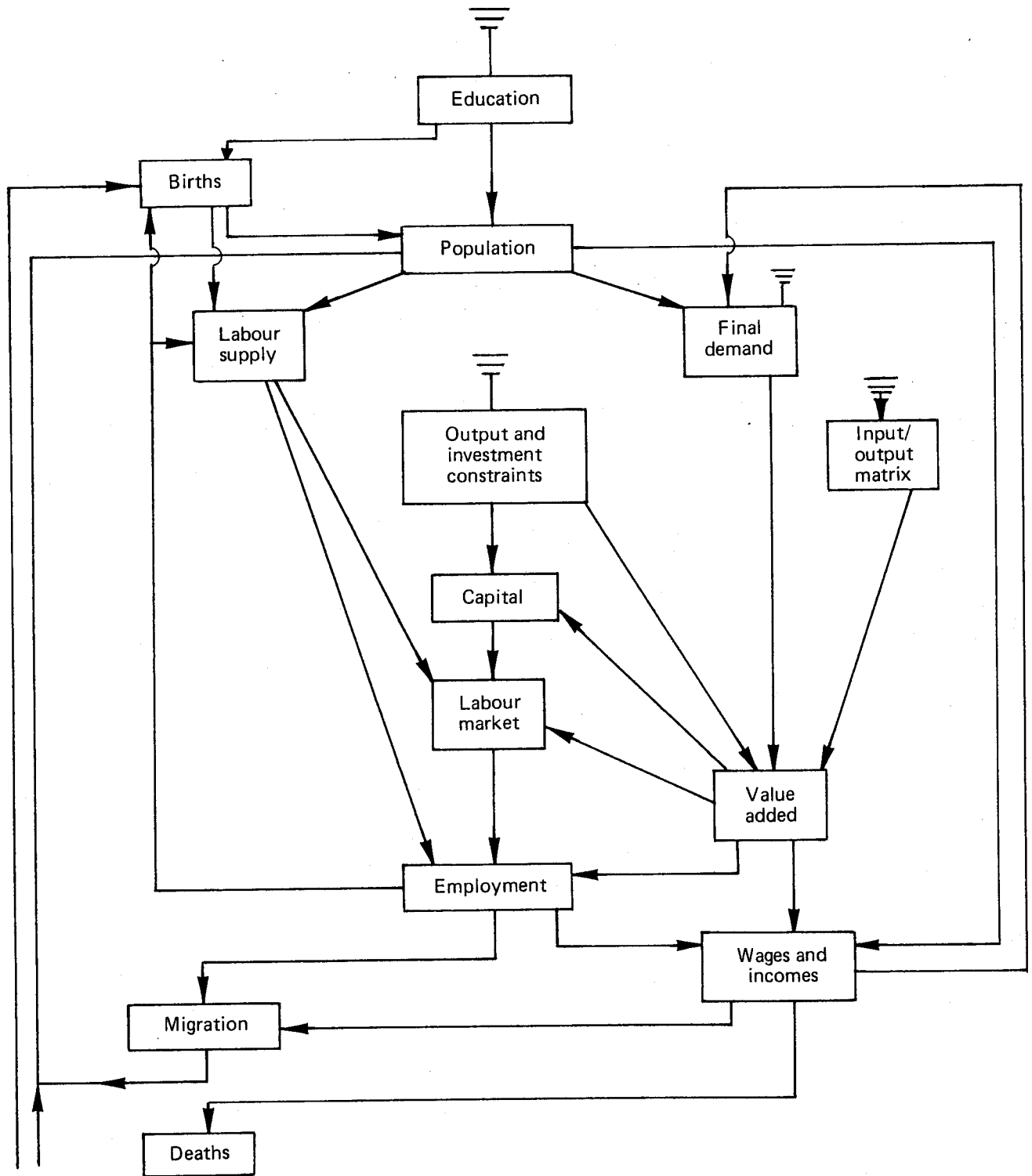
of decision making at the household level for such variables as fertility, marriage and household formation, migration, allocation of income between saving and consumption, expenditure patterns and labour force participation. The extent to which these areas can be integrated into a single, highly endogenous system is, to some extent, limited by the data base and also by theoretical short-comings in a number of areas. However, as far as possible, these variables are introduced endogenously and their interrelationships stressed. Fertility and labour force participation, for instance, are both crucial inputs to the over-all model. But the two variables are not independent of each other at the household level. The preference for a certain number of children—allowing that the household can, to some extent, control fertility in accordance with its preferences—is formed simultaneously with the expectation, for women, of a certain level of labour force participation; that is, future time is allocated between child-rearing and economic activity. Even if the hypothesis of a conscious decision is refuted in a specific case, it is undeniable that fertility affects female labour force participation sequentially. Moreover, the real income level, affecting both consumption patterns and fertility, is determined in part by both labour force participation and past fertility. There are many other similar interactions.

In the Philippine model, the effects of relationships of this type are strong, as can be shown by making specific exogenous modifications. In the base run, which uses a fertility function based on international cross-section relationships,[6] the crude birth rate would decline to 29 per 1,000 by 2000. If one assumes that a decline would occur only in urban areas and that rural fertility would remain constant, naturally, the rural population would be increased—61 per cent of population in 2000 compared with 53 per cent in the base run. However, urban population also would be slightly higher in absolute terms, by about 500,000, because of higher absolute levels of migration. The absence of fertility decline would reduce labour force participation by some 6 per cent for married females in rural areas in relation to the base run. These results are all more or less expected, except that a larger effect on the size of the urban population might be foreseen. However, there are some entirely unexpected outcomes, which also explain the small change in urban population. As a result of the increased rural population and the corresponding increase in dependency, household demand for food would jump sharply—by some 9 per cent for the important cereals sector in 1985. There is already some increase in the agricultural labour force, but most of the increase in population is below working age, so that constraints on the supply of agricultural goods are effective. This would lead to a large (19 per cent) rise in the price of agricultural goods compared with industrial goods, despite higher food imports, and consequently to an increase in real rural wages of about 12 per cent. The net result on income per equivalent adult would be no change in rural areas and a fall of 7 per cent in urban areas. Rural income per household would rise by roughly the same amount as urban income per household would fall. One consequence is that migration to urban areas would decline in relation to rural population;[7] another is a very slight improvement in income equality for the economy as a whole, the Gini concentration ratio falling from 0.49 to 0.48, though the incidence of urban poverty evidently would increase.

After a certain time, however, there would be an increased arrival of workers on the rural labour market, which would reduce the pressure on agriculture, depressing rural wages more than urban. In the year 2000, household incomes per equivalent adult would be 16 per cent less than in the reference run in rural areas and 6 per cent in urban areas.

An exogenous change in female labour force participation in both urban and rural areas would have rather less effect; raising its level by 20 per cent reduces the crude birth rate by less than 1 per 1,000. The effect would be greater in urban than in rural areas. The labour market effects are predictable, reducing unskilled modern and traditional sector wages and causing differentials to rise. There would be small increases in unemployment, and in over-all inequality, in both urban and rural areas. In addition, increased labour supply would raise agricultural output without raising demand, with the net effect that rural areas would fare somewhat worse than urban in terms of real income.

As these examples suggest, the links between the household decision model and the macro-economic system are numerous. In turn, the macro model generates a series of variables influencing household decisions. To cite but a few examples, the spatial distribution of income and employment availability affects the household-level decision whether to migrate; employment opportunities and the types of employment available affect fertility decisions and participation in economic activity; and income and educational levels are relevant to many aspects of household behaviour. An example of the way in which these largely economic variables feed through to the demographic side of the model, that of public works programmes, is given below.

Use of economic-demographic models in development planning

The discussion here concerns first the use of the Bachue type of model in the development planning process, followed by some examples from Bachue-Philippines which illustrate the way in which policies can be evaluated with the Bachue series of models.

A frequent criticism of model-building, often made with some justice, is that although complex models are

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[6] The base run assumes continued rapid educational expansion, a possibly unrealistic assumption given the relatively high existing educational levels of the Philippine population; allowance is made also for some effects on fertility of the existing family planning programme.

[7] Although, as stated above, absolute migration would be larger because rural population would be larger.

required to cover adequately economic or economic-demographic relationships, it is precisely those models which rarely make the transition from a conceptual apparatus to an effective planning instrument; in terms of the three-step process outlined above, the transition to the third step is difficult. Resistance to the use of large-scale models among planners can probably be traced—at least in part—to a perception of the planning process as vastly more complex than can be represented in even the most complex of models. Nevertheless, it is arguable that planners work on the basis of a series of mental models, which, due to their lack of explicitness, are difficult to analyse and evaluate in detail. An explicit quantitative model presents its assumptions clearly; and this transparency is a major advantage, both in understanding the way systems operate as a whole and in making possible improvements and developments easier to perceive and implement. In addition, where complex interrelationships are involved, only a similarly complex quantitative model can even generate the conclusions implicit in mental models.

One may ask, then, how a model of the Bachue type can be used in development planning and hence for policy purposes. There are four main uses. First, adopting a coherent modelling framework to tackle economic and demographic problems can have a unifying effect on the many bodies responsible for planning. This is so because it is rare to find planners for education, agriculture, population, energy etc. working to a focused plan in which it is possible to trace the various trade-offs, particularly in sharing the different parts of the expenditure allotment and in examining the interrelated effects of such expenditures. Often, it is found that the various components are planned in different departments or ministries with little or no attempt made to achieve consistency. Secondly, working to an agreed framework can identify areas that are under-researched but are essential to the planning process. Thus, the modelling process has implications for research policy. Thirdly, the process will identify areas in which data have not been collected but are essential for development planning, or areas in which data have been collected but are of poor quality, or areas in which data collection is needed on a more regular basis. This finding will have implications for policy in statistical offices. Lastly, and most importantly, the model can be used for evaluating policies. It can measure the cost-effectiveness of various policy instruments and the trade-offs between them, and can identify complementarities and redundancies between different policies.

It is this fourth use with which this article is concerned. The Bachue models are tools with which to examine the effects of specific policies or packages of policies; and as such, they have as their objective to educate the intuition of planners and decision-makers in selecting the best of alternative policies to achieve their objectives. This use is rather different from the popular view that models predict the future, but distinctions should be made between the types of problem being modelled and the time spans over which prediction is required. It is generally easier to be more accurate with predictions for the short term and with models of physical systems. For example, the position of a space rocket a specified number of days after take-off can be predicted very well in advance. However, as one moves across the spectrum from physical to social systems, prediction becomes more difficult. In the short term, economic predictions at the national level may achieve reasonable accuracy without high levels of endogeneity. But as one moves away from the physical, away from the short term and away from simplicity to more complex systems, one finds that the future becomes determined more by, on the one hand, factors unexplained in any given system and, on the other hand, by actions taken by policy-makers, than by any inherent quality of the system itself. Therefore for decision making, the value of single model outcomes is limited. The Bachue models, then, have not been designed as projection models, but as laboratories for policy experiments. This implies that there is no single result or projection produced by the models, and thus any presentation of quantitative output must be interpreted in the light of the policy package which is to be evaluated.

In the economic-demographic field, there is a wide range of relevant economic, demographic and social policy instruments. In implementing these policies, Governments direct their efforts towards specific objectives—either a single policy for a single objective, many policies for a single objective or a single policy for many objectives. Of course, any chosen set of policies will be subject to the usual discussion, debate and political will; but this merely implies that the model evaluates particular viewpoints, rather than determining the way in which a country should move. It is here that, in the absence of quantitative models, the planner's mental models are used, for a certain causality must be assumed, as well as a certain response elasticity. But there are also secondary effects for which allowance must be made; in a highly interrelated economic-demographic system, these secondary effects can be of major importance. When one takes into account the multiplicity of objectives, policy instruments and outcomes which a Government faces, then the cumulation or balancing of secondary effects may occur in a way which cannot be fully understood or evaluated without relatively complex models which attempt to cover as comprehensively as possible the relevant economic and demographic relationships.

It is for this context that Bachue was designed. Simulating population and employment relationships and behaviour, it can allow the performance of experiments in policy design which would otherwise have to be carried out in real life. Of course, as the model is a vast simplification of real life, it too is inaccurate. No planner who based his plans entirely on the outcomes of a single model would keep his job for long; and the inputs to the planning process which come from a

quantitative model are necessarily partial and must be complemented by an over-all grasp of factors outside the model, an appreciation of the reliability of the relationships within the model and experience of the planning process. In addition, many relevant objectives, mechanisms and decision criteria are not reflected in the model, particularly at the level of detailed, practical policy implementation—where to locate a rural factory, how best to provide credit to small-scale industry etc. Nevertheless, it can provide decision making in so far as knowledge of the relationships concerned will permit.

What, then, are the main issues which the Bachue models can handle? Broadly speaking, the models are directed towards the desirability of different types of demographic and economic change in terms of such outputs as employment, income, income distribution and population size and structure. The types of changes that the model can handle vary considerably and fall into two main classes. First, there are changes which are directly or fairly closely under government control. Examples of this type of change are direct and indirect tax rates, government expenditure and the consequences of government expenditure, such as school enrolment rates. Also arguably in this class are changes that could conceivably be introduced by government decree, such as compulsory reduction of migration ("rationing" of places in the city) or compulsory limits on wage levels or differentials. Secondly, many changes in the economic-demographic system can be introduced, which, although not in variables directly under policy control, are nevertheless considered attainable through certain combinations of policies outside the model. Examples of such changes are export promotion; the level and labour intensity of technical change, fertility or mortality changes outside the behavioural functions built into the model; the rural-urban distribution of production and investment; and, more generally, the levels of output and investment.

Changes in these variables, and in the many others which are similar, are experiments; that is, on the basis of these changes, an attempt is made to assess over the simulation period (to 2000 for the Philippine model) the behaviour of a number of system performance indicators. Which indicators will be most interesting will depend upon the change under consideration and the objectives of the experimenter. Among the more important possible outputs of Bachue-Philippines are income (per household, per nuclear household, per adult equivalent or *per capita*) and its distribution; employment levels; the extent of employment differentials and wage differentials, between different sectors, categories of labour and locations; the size and growth of population, its age structure, its family structure and its location (with implications for government expenditure on education, health and so on); migration rates; the pattern of consumption and possibly its nutritional implications; the educational structure of the population; the balance of payments; the labour force status of the

population; and a number of other indicators entering into welfare judgements.

Some examples from the Philippine work can show more clearly the way in which these experiments can be conducted and how their results should be interpreted. Examined below are education, migration and public works policies.

Education

The rate of growth of enrolment in school at different levels is an example of a variable under a fair degree of government control. Educational levels, of course, constitute an objective in themselves; but they also have widespread effects throughout the economic-demographic system, being directly involved in the determination of migration, fertility, labour supply, and labour market growth and structure (with consequent income distribution effects).

When the comparison is made between a zero rate of growth of educational graduation and a 2 per cent per annum growth rate,[8] by 2000 a considerable difference in average adult educational levels would have emerged, with the proportion having completed secondary school standing at 59 per cent (urban) or 35 per cent (rural) in the latter case, as against 48 per cent (urban) and 19 per cent (rural) in the former. Both fertility and migration would be affected: migration rises with higher educational growth and it would be 11 per cent higher by 2000; fertility declines more rapidly with faster educational growth, and the crude birth rate would be approximately 2 per cent lower by 2000. As a result, total population would be about 500,000 less, although urban population, as a result of migration, would be about the same. With respect to the net effect on the labour market, as a result of out-migration and of a slight change in the agriculture-industry terms of trade, rural wages would be higher by about 8 per cent in the higher education run. Urban skilled (educated) wages would decline significantly, and an important effect of the increased educational level would be to increase the number of educated people forced to find jobs in absorptive sectors. Unskilled modern-sector wages would be higher (by 8 per cent) as the proportion of the population without secondary education declined, with the net result that returns to education for those not obtaining more highly paid modern-sector jobs would drop to close to zero. Even within the modern sectors, the educated : uneducated wage ratio would drop from 2.80 to 2.22 in the more modern sectors (mining, modern manufacturing, modern services) and from 1.27 to 1.20 in construction and transportation.

The main conclusion to draw here is that from the labour market point of view, a 2 per cent rate of educational growth appears unnecessary and possibly undesirable; and although it reduces population growth,

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[8] These figures refer to growths in the percentage graduation of the population, which is itself growing. Thus, with the initial population growth rate over 3 per cent, the total expansion of the educational system in the case of 2 per cent graduation growth would be over 5 per cent.

it does not reduce urban population. On the other hand, the implication for government expenditure of the higher rate of educational growth is not large—total government expenditure would be only 5 per cent higher in 2000, partially because of feedbacks on fertility from the increased educational levels. There is evidently scope here for comparisons with alternative government expenditures—e.g., for health—in order to evaluate alternative allocations of government resources.

Migration

An example of a policy change sometimes raised for discussion, though rarely implemented, is to halt rural-urban migration through controls on population movement. This idea should not be rejected as impossible without considering the experience in China, where such controls, although evidently frequently evaded, have had considerable success. A run incorporating this policy produces some expected and some unexpected effects. The proportion of rural population would be considerably higher by 2000 (68 per cent compared with 53 per cent); and as expected, rural wages would be lower, by about 34 per cent. This large decline, due largely to the decline in the relative price of agricultural output, might well be offset if agricultural exports were promoted at the same time. Household incomes in rural areas also would decline sharply, whereas wages and household incomes in urban areas would increase by up to 65 per cent. The increase would be sharpest for the urban unskilled, since they constitute the group most heavily supplied by migration. Again, this rise could be reduced by the adoption of suitable policies with respect to sectoral output. Traditional sector urban wages also would rise by more than the average, with one result being somewhat improved income inequality in urban areas. However, the sharp change in rural-urban differentials would raise the over-all Gini coefficient by almost 10 per cent. Among the interesting side effects one may mention a 6 per cent rise in the over-all birth rate, a significant increase in mortality and declining rural and increasing urban labour force participation rates.

Public works

A third example of a policy that the model can investigate is the implementation of rural public works programmes. In one run, it was assumed that for the period 1976–1985, a programme would be implemented employing about 300,000 workers in construction in the initial year at a wage equal to that prevailing in the rest of the rural construction sector. The programme is held constant in money terms and its employment impact therefore would decline as wages rose (partially as a result of the programme). By 1985, it would account for additional employment of only 120,000 in construction at a wage which would have risen by 58 per cent (compared with 38 per cent in the reference run); part of the impact would be felt in other sectors, where wages also would rise more rap-

idly as a result of the withdrawal of labour to construction work. In 1976, the programme generates an addition to government expenditure of 14 per cent; by 1985, this figure would be down to 8 per cent.

Several interesting side effects are worth mentioning. First, migration would be down by 2.3 per cent in 1978 and 6.8 per cent in 1985. Secondly, in 1978 there would be increases in labour supply of rural non-household heads of between 0.5 and 0.7 per cent, raising total rural labour supply by about 0.4 per cent. The net effect of migration and labour supply changes would be to increase the rural labour force by 2,500 (migration) plus 44,500 (labour supply) to a total of 48,000 in 1978; and by 8,500 plus 83,500 to reach 92,000 in 1985. These figures represent 24 per cent and 48 per cent of the additional construction employment generated in those years. Thus, the availability of additional employment generates an extra labour supply which partially takes up the new jobs available. Thirdly, the increase in construction employment would withdraw some workers from agriculture, decreasing agricultural output somewhat, and move the terms of trade between industry and agriculture some 8 per cent towards agriculture, promoting an increase in rural wages. Other side effects are fairly small, even by 1985: urban wages would decline somewhat, largely because of the terms of trade effect, with the decrease largest for the educated who are less dissuaded from migrating by the availability of rural construction work; over all, incomes would become marginally more equal; the birth rate would fall by rather less than 1 per cent (rising in urban areas) and life expectancy would increase slightly in rural areas and decrease somewhat in urban areas. These changes are fairly small because the programme is small in relation to the rural economy as a whole. When a huge public works programme is implemented, at first employing over 1 million people, changes are indeed larger. In that case, migration would be 8 per cent lower in 1978 and 16 per cent in 1985, with an increase in rural labour supply of about 2.0 per cent. These two factors would account for 60 per cent of the employment generated in 1985, but the side effects on other rural wages would be much larger, increasing them by 20 to 25 per cent, with urban wages being down by up to 11 per cent. The Gini coefficient would decline from 0.49 to 0.47, a significant if not huge change. This size of programme also has some permanent effects—in the year 2000, rural wages would still be up to 8 per cent higher than those in the reference run.

The interpretation and use of results such as these requires some care. In the case of the public works programme, questions of location are important (the programme was assumed to be evenly distributed), as were seasonality of competing agricultural labour demand, details of organization, target labour force and so on. Moreover, the runs discussed above do not take into account the longer run implications for rural output capacity. In the educational experiment, the structure

and curriculum of the educational system, both relevant to its effects on the economic-demographic system, are not investigated. When deriving policy implications from any experiment, there will always be many associated issues which need to be assessed qualitatively or through the development of specifically designed submodels. Often, if the direction and rough magnitude of the primary effects of these issues can be assessed, they can be followed through by exogenously imposing an appropriate change on the model. In other cases, quantitative outputs need to be supplemented by purely qualitative analysis. Thus, a model like Bachue will rarely be used alone. It is designed to fill a gap in the planning process, to use existing knowledge of economic-demographic interrelationships to complement and build on more conventional planning methods. But without this conventional planning framework, its use for policy (as opposed to analytical) purposes is limited.

Another point worth stressing is that the outcomes of each experiment are conditional: they are conditional on certain changeable elements in the structure of the model; but more important, they are conditional on the system being allowed to run without policy response to its changes over time. To return to the educational ex-ample, it is not realistic to allow returns to education to fall to zero; action would be taken earlier, either to reduce educational growth or to develop industries based more intensively on skilled labour. The model gives many indications during each run of desirable policy response at different points in time, and future versions of the model will make it possible for the experimenter to respond appropriately and thus to interact with the model.

The building and testing of models of the Bachue type is not yet a routine activity. Models of this type represent the limits of one type of research input to policy uses; and in working to those limits, considerable scope for improvement and development is apparent. In a sense, a model is never complete; once it is in use in a planning framework, individual subsystems can be improved, intersystem interfaces extended, subsystems added, disaggregation extended and so on, depending upon the precise uses to which the model is put. Thus, the model can follow the limits of knowledge, can test new hypotheses and can be extended to cover new policy ideas. In this way models such as Bachue can play an extensive and important role in economic-demographic planning.

NEW UNITED NATIONS PROJECTIONS: A BRIEF SUMMARY OF THE PROJECTIONS OF TOTAL POPULATION AS ASSESSED IN 1973-1974

United Nations Secretariat *

In the cause of preparing the quinquennial updated United Nations projections, a revision was carried out in 1973–1974. The revised projections, by sex and age for each country, were used as a basis for new projections of urban and rural populations and of households and families. An earlier, provisional assessment had been carried out for use in the documentation of the World Population Conference, held at Bucharest in 1974. The final results of the sex-age projections, and an analysis of these results, are to appear in a United Nations publication entitled *World Population Prospects as Assessed in 1973*. This article discusses very briefly a few of the basic results of the projections.

AN OVERVIEW

The world population, which has been growing at an unprecedented rate during the past decade, will continue to grow rapidly throughout the remaining years of the twentieth century. This record rate of increase is expected to be 1.9–2.0 per cent per annum for the world between 1970 and 1985; but it may appreciably decline by the turn of the century, to 1.6 per cent per annum.

In the less developed regions,[1] the annual rate of growth is expected to maintain its current level of 2.3–2.4 per cent for about 15 years beginning in 1970; it would then follow a smooth downward trend between 1985 and 2000, reaching the level of 1.9 per cent in the last quinquennium of the century. In the more developed regions, on the other hand, the already substantially low annual rate of growth, about 0.9 per cent, would probably maintain a slow decline to 0.6 per cent by the turn of the century.

Consequently, the world population, which was 4 billion as of January 1976, may increase by 73 per cent between 1970 and 2000, from 3,610 million to 6,254 million. The expected increase may be 94 per cent in the less developed regions (from 2,526 million to 4,894 million) and may be only 25 per cent in the more developed regions (from 1,084 million to 1,360 million). The percentage distribution of the world population between the more developed and the less developed regions

would be greatly affected by these differential growth rates. The share of the more developed regions would continuously be shrinking from 30 to 22 per cent of the total world population from 1970 to 2000; and, obversely, that of the less developed regions is expected to expand from 70 to 78 per cent during the same period.

Although a major decline in fertility levels is expected in the less developed countries, little change is anticipated in the more developed countries. In the latter group, the gross reproduction rate will probably remain almost stable at the level of 1.1 until the end of the century and the crude birth rate would accordingly remain relatively unchanged at 16–17 per 1,000. In the less developed regions, on the contrary, the gross reproduction rate is anticipated to fall from 2.6 in 1970–1975 to 1.8 in 1995–2000; and a significant decline (26 per cent) in the crude birth rate is expected—from 38 per 1,000 in 1970–1975 to 28 per 1,000 in 1995–2000.

A continuous decline in mortality levels is anticipated in the less developed regions. An over-all gain of more than 10 years in life expectancy at birth for both sexes combined is expected before the turn of the century (from 52.2 in 1970–1975 to 62.6 in 1995–2000), and the crude death rate may decline from 14 to 9 per 1,000 towards the end of the century. In the same period, gains in life expectancy at birth are expected to be slightly more than two years in the developed countries, so that the gap in the levels of life expectancy at birth between the more developed and less developd regions, which was 19 years in 1970, would be halved in the next 25 years. The crude death rate of the less developed regions, which was considerably higher than that of the more developed regions in 1970–1975, 14 per 1,000 compared with 9 per 1,000, would have a substantial downward trend in the next 25 years. It might even become lower than that of the more developed regions, 9 per 1,000 as against 10 per 1,000, because of the larger percentage of young population in the less developed regions in contrast with the relatively larger proportion of the aged population in the more developed regions.

Mainly as a result of the global decline in fertility anticipated for the period 1970–2000, the world population would begin to experience an aging process. The proportion of the population under 15 would become smaller, falling from 37 to 32 per cent, whereas the proportion of the population 65 and over would increase

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* Population Division of the Department of Economic and Social Affairs.

[1] The "more developed regions" comprise Northern America, Europe, the Union of Soviet Socialist Republics, Japan, Temperate South America (Argentina, Chile and Uruguay), and Australia and New Zealand. All other regions are here considered as "less developed".

slightly from 5.5 to 6.3 per cent in the same period due to the effects of mortality decline. In the more developed regions, the relatively low proportion of the population under 15 years—27 per cent—was notable. This proportion is expected to decline further to 23 per cent by 2000, as a result of their continuously low fertility level. There would be a slight increase in the proportion of the old-age population (65 and over), from 9.6 to 12.4 per cent. In comparison, in the less developed regions, the expected decline in fertility would also begin its long process of aging in age structure, appreciably reducing their youth populations under 15 years from 41 to 35 per cent, coupled with an increasing proportion of their old-age populations from 3.7 to 4.7 per cent between 1970 and 2000, due to the mortality decline.

TOTAL POPULATION GROWTH

Tables 1 and 2, respectively, show the world population and five-year annual rate of growth, by major areas and regions, for the period 1970–2000, according to the "medium" variant. As mentioned above, the total world population would continue to grow at an almost con-

stant rate of 1.9 per cent until 1985; thereafter, a downward trend is expected to begin, leading to a reduction of the growth rate to 1.6 per cent by the end of the century. However, the population growth rate would vary in different major areas and regions, as well as in the more developed and less developed regions.

Among the eight major areas of the world, the highest current (1970–1975) annual rate of growth is observed in Latin America, namely, 2.7 per cent. After 1975, however, it would be surpassed by Africa, another continent in which the population is growing rapidly. Among the 24 regions of the world, the highest current annual rate of growth is observed in Middle America,[2] where the actual annual rate of growth is expected to increase from 3.2 to 3.3 per cent between 1970–1975 and 1975–1980. As the fertility decline outpaced the mortality decline, the growth rate would gradually decrease to about 2.9 per cent per annum by the end of the century. Actually, among the regions of the world, it is only in Middle America that the annual rate of growth is expected to remain higher than 3 per cent up to the period 1990–1995.

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[2] Including Costa Rica, El Salvador, Guatemala, Honduras, Mexico, Nicaragua and Panama.

TABLE 1. WORLD POPULATION GROWTH, BY MAJOR AREA AND REGION, 1970–2000

(_Medium variant; millions_)

Area and region	1970	1975	1980	1985	1990	1995	2000
World total	_3,610_	_3,968_	_4,374_	_4,817_	_5,280_	_5,763_	_6,254_
More developed regions	1,084	1,132	1,181	1,231	1,277	1,320	1,360
Less developed regions	2,526	2,836	3,193	3,586	4,003	4,443	4,894
Africa	_352_	_401_	_461_	_532_	_614_	_708_	_814_
Eastern Africa	100	114	132	153	178	207	240
Middle Africa	40	45	51	58	67	76	88
Northern Africa	86	98	113	130	150	171	192
Southern Africa	24	28	32	37	43	49	56
Western Africa	102	115	132	153	177	206	238
Latin America	_283_	_324_	_372_	_426_	_486_	_551_	_620_
Caribbean	25	27	30	33	37	41	45
Middle America	67	79	93	109	128	149	173
Temperate South America	36	39	42	44	47	50	52
Tropical South America	155	180	207	239	273	311	351
Northern America	_226_	_237_	_249_	_262_	_275_	_286_	_296_
East Asia	_927_	_1,006_	_1,088_	_1,165_	_1,233_	_1,302_	_1,370_
China	772	839	908	973	1,031	1,090	1,148
Japan	104	111	118	122	126	130	133
Other East Asia	51	56	63	69	76	83	89
South Asia	_1,101_	_1,250_	_1,427_	_1,625_	_1,836_	_2,054_	_2,267_
Eastern South Asia	283	324	371	423	479	536	592
Middle South Asia	742	838	954	1,083	1,222	1,363	1,501
Western South Asia	77	88	102	118	136	155	174
Europe	_459_	_473_	_487_	_500_	_514_	_527_	_540_
Eastern Europe	103	106	110	113	116	118	121
Northern Europe	80	82	84	86	87	89	91
Southern Europe	128	132	137	142	147	151	156
Western Europe	148	153	156	160	164	168	171
Oceania	_19_	_21_	_23_	_26_	_28_	_30_	_33_
Australia and New Zealand	15	17	18	20	22	23	25
Melanesia	3	3	4	4	5	5	6
Micronesia and Polynesia	1	1	2	2	2	2	2
USSR	_243_	_255_	_268_	_282_	_294_	_305_	_315_

SOURCE: Estimates and projections by the Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat.

TABLE 2. ANNUAL RATES OF POPULATION GROWTH, BY MAJOR AREA AND REGION, 1970-2000

(*Medium variant; percentage*)

Area and region	1970–1975	1975–1980	1980–1985	1985–1990	1990–1995	1995–2000
World total	*1.89*	*1.95*	*1.93*	*1.84*	*1.75*	*1.64*
More developed regions	0.86	0.85	0.82	0.75	0.65	0.60
Less developed regions	2.31	2.37	2.32	2.20	2.09	1.94
Africa	*2.64*	*2.77*	*2.86*	*2.88*	*2.86*	*2.77*
Eastern Africa	2.74	2.84	2.94	3.00	3.03	2.98
Middle Africa	2.27	2.44	2.62	2.68	2.73	2.74
Northern Africa	2.74	2.82	2.84	2.78	2.60	2.35
Southern Africa	2.70	2.89	2.87	2.78	2.78	2.73
Western Africa	2.58	2.75	2.88	2.95	2.97	2.92
Latin America	*2.71*	*2.74*	*2.71*	*2.64*	*2.51*	*2.37*
Caribbean	1.93	2.03	2.06	2.04	1.97	1.81
Middle America	3.21	3.27	3.29	3.21	3.06	2.91
Temperate South America	1.43	1.40	1.32	1.20	1.06	0.93
Tropical South America	2.90	2.88	2.82	2.71	2.57	2.41
Northern America	*0.90*	*0.99*	*1.06*	*0.95*	*0.79*	*0.69*
East Asia	*1.65*	*1.56*	*1.37*	*1.15*	*1.08*	*1.02*
China	1.66	1.58	1.39	1.16	1.10	1.04
Japan	1.26	1.12	0.82	0.61	0.52	0.51
Other East Asia	2.15	2.06	2.02	1.90	1.68	1.48
South Asia	*2.53*	*2.65*	*2.60*	*2.45*	*2.24*	*1.98*
Eastern South Asia	2.70	2.71	2.64	2.46	2.25	1.99
Middle South Asia	2.44	2.60	2.55	2.40	2.19	1.93
Western South Asia	2.83	2.92	2.92	2.81	2.63	2.36
Europe	*0.60*	*0.56*	*0.54*	*0.54*	*0.51*	*0.48*
Eastern Europe	0.64	0.63	0.56	0.50	0.48	0.51
Northern Europe	0.41	0.43	0.42	0.44	0.44	0.44
Southern Europe	0.72	0.71	0.68	0.66	0.62	0.57
Western Europe	0.58	0.46	0.48	0.50	0.46	0.40
Oceania	*1.96*	*1.94*	*1.86*	*1.73*	*1.59*	*1.45*
Australia and New Zealand	1.83	1.78	1.66	1.49	1.34	1.24
Melanesia	2.41	2.57	2.64	2.64	2.50	2.17
Micronesia and Polynesia	2.55	2.55	2.45	2.28	2.12	1.86
USSR	*0.99*	*1.00*	*0.98*	*0.85*	*0.73*	*0.67*

SOURCE: Estimates and projections by the Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat.

High annual rates of population growth are also expected in all regions of Africa, where a rate of 2.6 per cent for 1970–1975 is expected to increase to 2.9 per cent in the quinquennium 1985–1990; thereafter, it will slowly decline to 2.8 by the end of the century. The high growth rate in Africa, which is expected to increase in the period 1975–1990, is mainly due to its persistently high fertility rate as expressed by its crude birth rate, anticipated to be at the level of 43–46 for the said period, as is shown in table 3. Among five regions of Africa, a notable exception is Northern Africa, comprising Arab countries in Africa, where a currently high growth rate reflecting a quite rapid mortality reduction would be substantially curtailed because of its anticipated relatively rapid decline in fertility, for example, its crude birth rate is expected to be reduced from 43 to 32 by the end of the century. On the other hand, in Southern Africa, which shows a slight increase in annual rate of growth from 2.7 to 2.9 per cent between the periods 1970–1975 and 1975–1980, even an increase in the crude birth rate, from 43.0 to 43.2, is expected between the same periods.

A decline in annual rate of growth is expected to begin in South Asia after 1975–1980, falling from 2.7 to 2.0

per cent towards the turn of the century. Middle South Asia, which includes mainly the countries in the Indian subcontinent (India, Bangladesh, Pakistan etc.),[3] which grew at a rate of 2.4 per cent in the period 1970–1975, is expected to increase at a considerably reduced rate of 1.9 per cent in 1995–2000. Its growth rate until the end of the century would not be among the highest and it would be fairly close to the average pattern for the less developed regions, but its sheer size of growth would be noteworthy, namely, from 742 million to 1,501 million between 1970 and 2000.

Among the less developed regions, the smallest rate of increase is expected in East Asia, where the current rate of growth is 1.7 per cent. This rate should go down to 1.0 per cent by the end of this century. Noteworthy is the difference in rates of population growth in China and in Other East Asia. It has been estimated that the population of China is currently increasing at 1.7 per cent per annum, while the population of Other East Asia, which excludes Japan, is growing at 2.2 per cent.

[3] Middle South Asia includes Afghanistan, Bangladesh, Bhutan, India, Iran, Maldives, Nepal, Pakistan, Sikkim and Sri Lanka.

99

TABLE 3. CRUDE BIRTH RATES, BY MAJOR AREA AND REGION, 1970–2000

(Medium variant; rates per 1,000 population)

Area and region	1970–1975	1975–1980	1980–1985	1985–1990	1990–1995	1995–2000
World total	*31.5*	*31.1*	*30.1*	*28.4*	*26.8*	*25.1*
More developed regions	17.2	17.4	17.4	16.8	16.0	15.6
Less developed regions	37.5	36.4	34.6	32.3	30.2	27.8
Africa	*46.3*	*45.7*	*44.8*	*43.3*	*41.5*	*39.1*
Eastern Africa	48.1	47.4	46.4	45.3	44.0	41.9
Middle Africa	44.4	44.2	44.3	43.2	41.9	40.5
Northern Africa	43.3	42.0	40.5	38.3	35.2	31.6
Southern Africa	43.0	43.2	41.3	38.9	37.6	36.2
Western Africa	48.7	48.5	47.9	46.7	45.0	42.7
Latin America	*36.9*	*36.1*	*35.0*	*33.4*	*31.5*	*29.6*
Caribbean	32.8	31.9	31.2	30.1	28.4	26.1
Middle America	42.2	41.6	40.8	39.1	36.9	34.8
Temperate South America	23.3	22.8	21.9	20.7	19.3	18.1
Tropical South America	38.3	37.0	35.4	33.5	31.5	29.3
Northern America	*16.5*	*17.5*	*18.4*	*17.5*	*15.9*	*15.1*
East Asia	*26.2*	*24.6*	*22.3*	*19.6*	*18.8*	*18.1*
China	26.9	25.2	22.8	19.9	19.0	18.3
Japan	19.2	18.0	15.4	13.9	13.9	14.5
Other East Asia	30.2	28.7	27.8	25.9	23.2	21.0
South Asia	*41.9*	*40.7*	*38.4*	*35.4*	*32.0*	*28.4*
Eastern South Asia	42.4	40.6	38.3	35.1	31.7	28.1
Middle South Asia	41.7	40.7	38.4	35.4	32.0	28.3
Western South Asia	42.8	42.0	40.7	38.2	35.2	31.4
Europe	*16.1*	*16.1*	*16.1*	*16.1*	*15.7*	*15.3*
Eastern Europe	16.6	16.8	16.4	15.7	15.3	15.3
Northern Europe	15.8	16.1	16.1	16.3	16.1	15.8
Southern Europe	17.7	17.3	17.2	17.1	16.7	16.2
Western Europe	14.6	14.4	14.9	15.2	14.7	14.1
Oceania	*24.8*	*25.1*	*24.7*	*23.7*	*22.5*	*21.2*
Australia and New Zealand	21.2	21.6	21.2	20.2	19.2	18.7
Melanesia	40.7	40.7	39.8	38.2	35.3	30.5
Micronesia and Polynesia	32.9	32.1	30.7	28.5	26.7	24.0
USSR	*17.8*	*18.4*	*18.7*	*17.8*	*16.8*	*16.3*

SOURCE: Estimates and projections by the Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat.

By the end of the century, the rates would be 1.0 and 1.5 per cent, respectively. Thus, among the less developed regions, China is expected to have the smallest annual rate of growth throughout the period 1970–2000. Following China, it is the Other East Asia region where a notable deceleration in growth rate is expected.

Among the less developed regions, differential growth by region may be summarized as follows. The population of the less developed regions as a whole may double by the end of the century, increasing from 2,526 million to 4,894 million. The largest percentage increase is expected in Middle America, with a 158 per cent between 1970 and 2000; the smallest percentage increase would occur in China, about 49 per cent in the same period. All other less developed regions, excluding the Caribbean and Other East Asia, would at least double their populations by the turn of the century.

The largest addition to the population in the projection period is expected in Middle South Asia, which currently contains about 21 per cent of the world population. As table 1 shows, the population of this region is anticipated to be more than double, increasing from 742 million in 1970 to 1,501 million in 2000. The

next region of importance with respect to population growth is China, where the absolute increase will be from 772 million to 1,148 million in the period 1970–2000.

As table 1 shows, the population of the more developed regions is anticipated to increase from 1,084 million in 1970 to 1,360 million in 2000. Among the more developed regions, the highest rate of growth has been in the region of Australia and New Zealand in Oceania, 1.8 per cent per annum from 1970 to 1975; followed by Temperate South America, 1.4 per cent during the same period. The smallest annual rate of growth—0.4 per cent per annum—has been observed in Northern Europe. By the turn of the century, it is anticipated that growth rates among all the more developed regions will be well below 1 per cent, except in Australia and New Zealand, where the rate is expected to be 1.2 per cent (see table 2).

As a result of these growth patterns, the percentage increase of population among the more developed regions during the period 1970–2000 is expected to be highest again in Australia and New Zealand, namely, 59 per cent; and lowest in Northern Europe, 14 per cent. The percentage increases in the European regions,

except in Southern Europe, where the population would grow by about 22 per cent during the same period, would be about half the percentage increase of population in all the other more developed regions. Between 1970 and 2000, Eastern Europe, Northern Europe and Western Europe are anticipated to increase by about 16 per cent, and Temperate South America by 44 per cent. In terms of absolute size, the largest increase in population is expected in Northern America and the Union of Soviet Socialist Republics, roughly 70 million each between 1970 and 2000, whereas the smallest gain is anticipated in Northern Europe, about 10 million during the same period.

As a consequence of differential rates of growth among different regions and major geographical areas, the distribution of population of the world by regions would change. The percentage share of each of the less developed regions in the total world population is expected to increase between 1970 and 2000, except in China, where the percentage share would decrease from 21 to 18 per cent. The less developed regions as a whole would increase considerably their share, from 70 per cent in 1970 to 78 per cent in 2000. As is well known, the largest single proportion of the world population is currently that of China as a region; but by the end of the century, it would be replaced by Middle South Asia containing mainly those countries in the Indian subcontinent, which would expand its share from 21 per cent in 1970 to 24 per cent in 2000. India alone, which currently accounts for 15 per cent, would grow to comprise 17 per cent in 2000.

Conversely, the share by the more developed regions would sharply decrease, from 30 to 22 per cent, between 1970 and 2000. Correspondingly, in that period, all the more developed regions would experience a decline in the proportion of population, except in Temperate South America, and Australia and New Zealand, where the percentage shares of the would population would remain the same at 1 per cent and 0.4 per cent, respectively, throughout the period.

FERTILITY

For the world as a whole, the most recent projections show a decline of the crude birth rate from 31.5 to 25.1 per 1,000 between the periods 1970–1975 and 1995–2000, or a decline of 20 per cent. In comparison, the birth rate in the less developed regions as a whole would follow a gradual decrease from 37.5 to 27.8 per 1,000 during the same period. Table 3 shows changes in the crude birth rate, by major area and region, for the period 1970–2000. The sizable downward trend in the less developed regions is the result of averaging the different fertility levels and trends of countries and regions within the less developed regions.

As is shown in table 4, fertility as measured by the gross reproduction rate [4] is estimated to remain rela-

tively unchanged at the level of approximately 2.7 in all African regions, excluding Northern Africa, until 1980–1985; but it is anticipated that it will decline tangibly after 1985. In Africa as a whole, the gross reproduction rate is 3.10 for the period 1970–1975; but it would decrease to 3.02 during 1980–1985 and further decline to 2.55 by the period 1995–2000. It should also be noted that significant declines in fertility are expected in Northern Africa, where the gross reproduction rate has been assumed to decline from 3.05 to 2.02. While the crude birth rate of Africa as a whole is projected to drop from 46.3 to 39.1 per 1,000 between 1970–1975 and 1995–2000, that is, 16 per cent; the crude birth rate of Northern Africa would decline from 43.3 to 31.6 per 1,000, by 27 per cent, in the corresponding period. At the level of major geographical areas, however, Africa is the region in which the highest gross reproduction rates and crude birth rates are expected to exist during the projection period.

Sizable declines in fertility are foreseen in Latin America, where the gross reproduction rate should decline from 2.57 to 1.89 and the crude birth rate from 36.9 to 29.6 per 1,000, a 20 per cent reduction, between 1970–1975 and 1995–2000. Significant differences in future fertility trends within Latin America are expected. In Middle America, the gross reproduction rate is expected to remain quite high throughout the projection period, even though it would decline significantly, from 3.11 to 2.33, between 1970 and 2000. In terms of the crude birth rate, it would decline from 42.2 to 34.8 in those years. During the same period, the corresponding rate for the Caribbean would decrease from its initial level of 2.27 to 1.63.

In East Asia, where the current level of fertility is already low (the gross reproduction rate is 1.75), the gross reproduction rate is projected to have a continuous downward trend to 1.10 by the end of the century. In the measure of crude birth rate, it would decline substantially from 26.2 to 18.1, by 31 per cent. China would experience further considerable declines in its gross reproduction rate, from 1.84 to 1.10; and in its crude birth rate, from 26.9 to 18.3 (32 per cent), between 1970–1975 and 1995–2000.

Substantial declines in gross reproduction rates are also anticipated in South Asia, from 2.92 to 1.82, notably in Eastern South Asia [5] (mainly east of the Indian subcontinent), from 2.85 to 1.77 between 1970 and 2000. In terms of crude birth rate, during the same period it would decline in South Asia by 32 per cent, from 41.9 to 28.4 per 1,000. By the same token, Eastern South Asia would experience the most rapid decline in crude birth rate among the regions, from 42.4 to 28.1, a 34 per cent decrease, during the same period.

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[4] The gross reproduction rate represents the average number of daughters that would be borne by a cohort of females all

of whom lived to the end of the childbearing period if the cohort bore children according to a given set of age-specific fertility rates.

[5] Eastern South Asia includes the following countries or areas: Burma, Democratic Kampuchea, the Democratic Republic of Viet-Nam, Indonesia, the Lao People's Democratic Republic, Malaysia, Philippines, Portuguese Timor, the Republic of South Viet-Nam, Singapore and Thailand.

TABLE 4. GROSS REPRODUCTION RATES, BY MAJOR AREA AND REGION, 1970-2000

(*Medium variant*)

Area and region	1970–1975	1975–1980	1980–1985	1985–1990	1990–1995	1995–2000
World total	*2.13*	*2.06*	*1.97*	*1.85*	*1.74*	*1.60*
More developed regions	1.13	1.10	1.10	1.09	1.09	1.09
Less developed regions	2.57	2.46	2.30	2.11	1.94	1.75
Africa	*3.10*	*3.07*	*3.02*	*2.91*	*2.76*	*2.55*
Eastern Africa	3.18	3.19	3.16	3.08	2.96	2.76
Middle Africa	2.86	2.86	2.88	2.84	2.77	2.66
Northern Africa	3.05	2.93	2.77	2.56	2.30	2.01
Southern Africa	2.76	2.76	2.71	2.63	2.51	2.34
Western Africa	3.24	3.24	3.22	3.15	3.02	2.82
Latin America	*2.57*	*2.45*	*2.33*	*2.19*	*2.04*	*1.89*
Caribbean	2.27	2.14	2.01	1.89	1.77	1.63
Middle America	3.11	3.00	2.88	2.70	2.51	2.33
Temperate South America	1.54	1.49	1.41	1.33	1.25	1.16
Tropical South America	2.63	2.48	2.32	2.16	2.00	1.84
Northern America	*1.07*	*0.99*	*1.02*	*1.04*	*1.04*	*1.04*
East Asia	*1.75*	*1.58*	*1.39*	*1.21*	*1.15*	*1.10*
China	1.84	1.64	1.42	1.21	1.15	1.10
Japan	1.05	1.06	1.04	1.02	1.02	1.01
Other East Asia	2.09	1.85	1.65	1.50	1.37	1.27
South Asia	*2.92*	*2.83*	*2.66*	*2.41*	*2.13*	*1.82*
Eastern South Asia	2.85	2.76	2.59	2.35	2.07	1.77
Middle South Asia	2.94	2.84	2.68	2.43	2.14	1.83
Western South Asia	3.08	3.01	2.88	2.67	2.39	2.05
Europe	*1.11*	*1.08*	*1.08*	*1.08*	*1.08*	*1.08*
Eastern Europe	1.07	1.05	1.05	1.06	1.07	1.08
Northern Europe	1.14	1.12	1.10	1.11	1.10	1.10
Southern Europe	1.22	1.19	1.17	1.16	1.14	1.13
Western Europe	1.04	.99	1.00	1.02	1.02	1.02
Oceania	*1.66*	*1.63*	*1.59*	*1.54*	*1.47*	*1.38*
Australia and New Zealand	1.40	1.37	1.34	1.30	1.26	1.22
Melanesia	2.93	2.92	2.83	2.68	2.45	2.07
Micronesia and Polynesia	2.23	2.03	1.84	1.68	1.57	1.43
USSR	*1.18*	*1.17*	*1.16*	*1.14*	*1.14*	*1.14*

SOURCE: Estimates and projections by the Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat.

By the end of the century, the gross reproduction rates in all the Asian regions, excluding Western South Asia, where fertility is high and the decline would be relatively slow, would attain a level below 2.0.

The crude birth rate of the more developed regions is expected to decrease slightly from the level of 17.2 per 1,000 in 1970–1975 to 15.6 in 1995–2000, while the gross reproduction rate would remain virtually constant at the level of 1.1.

A glimpse into the regional fertility variations of Europe shows that for the gross reproduction rate, almost constant levels of approximately 1.1 are assumed in Eastern, Northern and Western Europe throughout the projection periods. The initial level of 1.22 in Southern Europe is expected to decrease and reach 1.13 by the end of the century. The trend assumed for Northern America is similar to that of Western Europe, namely, constant fertility close to the replacement level throughout the projection period. In both Western Europe and Northern America, the latter region being largely influenced by the trend in the United States of America, it is interesting to note that according to the projections, a subunity rate of gross reproduction is to be expected during the period 1975–1980.

A very slowly decreasing pattern is likewise assumed for Japan, with the net replacement level assumed to be attained by the end of the century, with a considerable reduction in the crude birth rate, from 19.2 to 14.5, reflecting a simultaneous transformation in the age structure. A similarly continuous downward trend is assumed also for the Soviet Union, from its initial level of 1.18 in 1970–1975 to 1.14 in 1995–2000. The assumptions for Temperate South America and for Australia and New Zealand, where current fertility levels are still comparatively high, indicate that during the remainder of this century continuous and sizable declines can be expected in the trend towards the net replacement level by the next century.

MORTALITY

As previously mentioned, according to the results of the "medium" projections, the crude death rates of both the more developed and less developed regions would be equal around 1990; thereafter, that of the more developed regions would become higher. As shown in table 5, a slight increase over the projection period in the crude death rate of the more developed

TABLE 5. CRUDE DEATH RATES, BY MAJOR AREA AND REGION, 1970-2000

(Medium variant; rates per 1,000 population)

Area and region	1970–1975	1975–1980	1980–1985	1985–1990	1990–1995	1995–2000
World total	*12.8*	*11.9*	*11.0*	*10.2*	*9.5*	*8.9*
More developed regions	9.2	9.4	9.6	9.8	9.9	9.9
Less developed regions	14.3	12.8	11.5	10.4	9.4	8.6
Africa	*19.8*	*18.0*	*16.2*	*14.5*	*12.9*	*11.4*
Eastern Africa	20.7	19.0	17.1	15.4	13.7	12.1
Middle Africa	21.7	19.8	18.1	16.4	14.6	13.0
Northern Africa	15.2	13.4	11.8	10.4	9.1	8.0
Southern Africa	16.2	14.5	12.8	11.3	10.0	9.0
Western Africa	23.0	21.0	19.2	17.2	15.3	13.5
Latin America	*9.2*	*8.3*	*7.5*	*6.8*	*6.2*	*5.7*
Caribbean	9.1	8.5	8.0	7.4	6.9	6.4
Middle America	9.4	8.3	7.4	6.6	6.0	5.4
Temperate South America	8.9	8.9	8.9	8.9	8.9	8.9
Tropical South America	9.2	8.2	7.2	6.4	5.8	5.2
Northern America	*9.3*	*9.5*	*9.6*	*9.6*	*9.7*	*9.8*
East Asia	*9.8*	*9.1*	*8.6*	*8.2*	*8.0*	*7.9*
China	10.3	9.5	8.8	8.3	8.0	7.8
Japan	6.6	6.8	7.3	7.9	8.6	9.4
Other East Asia	8.7	7.9	7.3	6.8	6.5	6.3
South Asia	*16.7*	*14.6*	*12.8*	*11.3*	*10.0*	*8.9*
Eastern South Asia	15.4	13.6	11.9	10.4	9.2	8.3
Middle South Asia	17.0	14.8	13.0	11.4	10.1	9.0
Western South Asia	14.3	12.8	11.5	10.1	8.8	7.7
Europe	*10.4*	*10.6*	*10.7*	*10.7*	*10.6*	*10.4*
Eastern Europe	10.2	10.5	10.7	10.6	10.4	10.1
Northern Europe	11.2	11.4	11.5	11.5	11.4	11.1
Southern Europe	9.2	9.5	9.8	10.0	10.2	10.2
Western Europe	11.1	11.2	11.2	11.0	10.8	10.6
Oceania	*9.3*	*9.0*	*8.7*	*8.4*	*8.2*	*8.0*
Australia and New Zealand	8.1	8.0	7.9	8.0	8.0	8.0
Melanesia	16.6	15.0	13.4	11.9	10.3	8.8
Micronesia and Polynesia	7.4	6.7	6.2	5.8	5.5	5.3
USSR	*7.9*	*8.4*	*9.0*	*9.3*	*9.5*	*9.6*

SOURCE: Estimates and projections by the Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat.

regions, from 9.2 to 9.9 per 1,000, the latter of which would be higher by 1.3 per 1,000 than 8.6 per 1,000 for the less developed regions in the corresponding period, is entirely due to the continued aging of the population in the more developed regions despite the fact that the less developed regions still lag behind the more developed regions in terms of life expectancy.

In the less developed regions, as shown in table 6, a gain of slightly more than 10 years in life expectancy at birth is expected between 1970–1975 and 1995–2000, from 52.2 to 62.6. The lowest levels of life expectancy at birth have been assumed in Eastern, Middle and Western Africa, during the projection period 1970–2000. In each of these regions, however, the steepest increase, about 12–13 years, is assumed. By and large, it has been assumed in the current series of world population projections that the tempo of life expectancy improvement will be relatively faster up to the level of 60 years, but that it will decelerate after reaching that level. By the turn of the century, the life expectancies at birth of all the regions in Latin America and East Asia, plus Micronesia and Polynesia in Oceania, are expected to reach levels of about 70 years; but Africa, South Asia and Melanesia in Oceania

would reach the levels of 56.6, 60.8 and 61.2, respectively. It is notable that East Asia, even excluding Japan, would attain the level of 70 years by the end of the twentieth century.

Turning to the more developed regions, as each individual region has almost reached the level of 70 years for both sexes combined and the more developed regions as a whole have a value of 71.1 years for the period 1970–1975, the increase would naturally be very small, up to 73.4 as a group by the end of the century. In Japan, Northern Europe and Western Europe, life expectation is expected to reach the level of 75 years; and all the other regions would also surpass the level of 70 years. Temperate South America, including Argentina, Chile and Uruguay, is and would continue to be somewhat behind the other more developed regions in terms of improvement of life expectancy.

PROJECTED CHANGES IN AGE STRUCTURE

Not only changes in the total population, but changes in the age structure of population have many important implications, the most fundamental being to affect the

103

TABLE 6. LIFE EXPECTANCY AT BIRTH FOR BOTH SEXES COMBINED, BY MAJOR AREA AND REGION,
1970-2000

(*Medium variant; years*)

Area and region	1970–1975	1975–1980	1980–1985	1985–1990	1990–1995	1995–2000
World total	*55.2*	*57.2*	*59.0*	*60.7*	*62.4*	*64.1*
More developed regions	71.1	71.7	72.2	72.6	73.0	73.4
Less developed regions	52.2	54.6	56.7	58.7	60.7	62.6
Africa	*45.0*	*47.3*	*49.7*	*52.0*	*54.4*	*56.6*
Eastern Africa	43.8	46.0	48.5	50.9	53.3	55.6
Middle Africa	41.9	44.3	46.7	49.2	51.8	54.3
Northern Africa	52.0	54.4	56.8	59.2	61.4	63.5
Southern Africa	50.8	53.3	55.7	58.0	60.2	62.2
Western Africa	40.9	43.2	45.6	48.0	50.6	53.1
Latin America	*61.4*	*63.5*	*65.4*	*67.2*	*68.8*	*70.3*
Caribbean	63.1	64.3	65.7	67.1	68.6	70.2
Middle America	61.5	63.9	65.7	67.2	68.6	69.8
Temperate South America	66.5	67.9	68.7	69.4	70.1	70.7
Tropical South America	60.5	62.7	64.9	66.9	68.9	70.6
Northern America	*71.4*	*71.7*	*72.0*	*72.2*	*72.4*	*72.5*
East Asia	*62.5*	*64.4*	*66.1*	*67.8*	*69.3*	*70.6*
China	61.6	63.6	65.5	67.2	68.8	70.2
Japan	73.3	74.3	74.6	74.7	74.8	74.8
Other East Asia	61.1	63.2	65.2	67.0	68.5	69.9
South Asia	*48.5*	*51.4*	*53.9*	*56.4*	*58.6*	*60.8*
Eastern South Asia	50.6	53.2	55.6	58.0	60.2	62.3
Middle South Asia	48.0	50.9	53.5	55.9	58.2	60.4
Western South Asia	53.8	56.1	58.4	60.5	62.5	64.3
Europe	*71.2*	*71.9*	*72.5*	*73.1*	*73.6*	*74.0*
Eastern Europe	69.7	70.5	71.2	71.9	72.6	73.2
Northern Europe	72.5	72.9	73.4	73.9	74.3	74.7
Southern Europe	70.9	71.6	72.1	72.6	73.0	73.3
Western Europe	72.0	72.7	73.3	73.8	74.4	74.9
Oceania	*65.8*	*66.8*	*67.6*	*68.4*	*69.3*	*70.4*
Australia and New Zealand	72.3	72.7	73.1	73.4	73.7	73.9
Melanesia	48.4	50.9	53.5	55.9	58.5	61.2
Micronesia and Polynesia	62.8	64.5	66.0	67.5	69.1	70.3
USSR	*70.4*	*70.9*	*71.5*	*72.0*	*72.5*	*73.0*

SOURCE: Estimates and projections by the Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat.

limits of the society's reproductive potential. Fluctuations in the numbers of persons attaining particular ages can have significant repercussions—for example, in producing short-term pressures on schools, employment opportunities and needs for new housing units.

Table 7, which shows the current distribution of the world population in three major age groups (under 15, 15–64 and 65 years and over) under the "medium" variant assumption, will immediately make clear the gradual aging of the population of the world between 1970 and 2000. In 1970, 5.5 per cent of the world population were over 65 years old. By the turn of the century, this proportion is likely to increase to 6.3 per cent. On the other hand, for the same period, the percentage of the youth population under 15 years of age may decline from 37 to 32 per cent. Hence, gains are expected in the working-age population, 15–64 years; this proportion would increase from 58 to 61 per cent in the same period.

The difference in the proportion of the population under 15 years is one of the salient features distinguishing the more developed and the less developed regions. In 1970, children under 15 years of age con-

stituted 41 per cent of the total population in the less developed regions, whereas they made up only 27 per cent in the more developed regions. By 2000, this group would constitute 35 and 23 per cent for the less developed and more developed regions, respectively. The more developed countries definitely have an economic advantage over the less developed countries in that 64 per cent of the population are of working age, 15–64 years; but the corresponding proportion for the less developed countries is only 56 per cent. By 2000, these proportions are expected to become, respectively, 65 and 60 per cent, clearly showing a trend of convergence. Similarly, a comparison of the proportion of the old-age population (65 years and over) also shows a vivid distinction between these two different groups of development: 10 per cent in the more developed countries and only 4 per cent in the less developed countries. It is expected to become 12 and 5 per cent, respectively, by 2000, indicating that the gaps between the more developed and less developed would be widening rather than narrowing, inasmuch as the process of aging which reaches the apex of the population pyramid is slow in the less developed regions.

(Medium variant; percentage)

Area and region	1970 0–14	1970 15–64	1970 65+	2000 Under 15	2000 15–64	2000 65+
World total	36.6	57.9	5.5	32.4	61.3	6.3
More developed regions	26.7	63.7	9.6	22.6	65.0	12.4
Less developed regions	40.8	55.4	3.7	35.1	60.2	4.7
Africa	44.1	53.0	2.9	43.0	53.7	3.3
East Africa	44.4	52.9	2.7	44.9	52.1	3.1
Middle Africa	43.0	54.3	2.8	43.3	53.3	3.4
Northern Africa	44.8	51.9	3.4	38.5	57.7	3.8
Southern Africa	41.0	54.9	4.1	41.6	54.5	3.9
Western Africa	44.4	53.1	2.5	45.1	52.0	2.9
Latin America	42.7	53.5	3.7	37.5	58.0	4.5
Caribbean	41.5	53.5	4.9	34.7	59.8	5.5
Middle America	46.4	50.2	3.4	41.8	54.7	3.5
Temperate South America	31.4	61.9	6.7	26.0	64.6	9.4
Tropical South America	43.9	53.1	3.0	37.4	58.4	4.2
Northern America	28.4	61.9	9.7	22.7	66.4	10.8
East Asia	33.6	60.9	5.4	25.1	67.1	7.8
China	34.5	60.2	5.4	25.3	67.3	7.4
Japan	24.0	68.9	7.1	20.1	66.7	13.2
Other East Asia	42.2	54.4	3.4	29.8	64.6	5.6
South Asia	43.4	53.6	3.0	36.5	59.5	3.9
Eastern South Asia	43.8	53.3	2.9	36.5	59.7	3.9
Middle South Asia	43.3	53.8	2.9	36.4	59.8	3.8
Western South Asia	43.0	53.2	3.8	38.6	57.2	4.2
Europe	24.9	63.7	11.4	22.1	64.4	13.5
Eastern Europe	24.6	65.0	10.4	21.7	65.2	13.1
Northern Europe	24.2	63.2	12.7	22.8	64.1	13.0
Southern Europe	26.4	63.7	9.8	23.0	63.3	13.7
Western Europe	24.2	63.0	12.8	21.1	65.0	13.9
Oceania	32.2	60.6	7.3	29.2	62.9	7.9
Australia and New Zealand	29.4	62.3	8.4	26.5	64.3	9.2
Melanesia	42.4	54.6	3.1	39.0	57.4	3.7
Micronesia and Polynesia	44.6	52.6	2.8	32.7	62.8	4.5
USSR	28.6	63.6	7.8	23.6	64.2	12.2

SOURCE: Estimates and projections by the Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat.

No important changes are expected in the age structure of the different regions in Europe. In all, following the slight decline in the fertility and the gains in life expectancy at birth in advanced ages, the proportion of children under 15 years of age is expected to decrease constantly, and the proportion of old-age population would probably increase. By the end of the century, it is anticipated that among all the regions, the highest proportion of old-age population—14 per cent—will be found in Western Europe. In 1970, Japan, which had already a proportion of children (24 per cent) close to that observed in Europe, had, nevertheless, the lowest proportion of old-age population (7 per cent) among all the more developed regions; and it is expected to undergo further substantial changes in its age structure before the end of this century. By 2000, it would have the lowest proportion of children of all the regions in the world, namely, 20 per cent; and the proportion of old-age population would attain the level anticipated also in Europe, namely, 13 per cent. Among the more developed regions, Temperate South America, and Australia and New Zealand are expected to have,

in 2000, the highest proportion of children, 26.0 and 26.5 per cent, respectively, and the lowest proportion of old-age population, 9.4 and 9.2 per cent, respectively.

Among the less developed regions, the most impressive changes would occur in China and Other East Asia, where the percentage of population under 15 years would drop from 35 to 25 and from 42 to 30 per cent, respectively. By the turn of the century, China would have the largest percentage of active-age population among all the world regions, 67 per cent.

In South Asia, the decline anticipated in fertility would lead to a decrease in the proportion of children, from 43 per cent to 37 per cent, between 1970 and 2000. In Western South Asia, the trends of decline would be slower and the percentage would fall to the level of 39 per cent by 2000.

Decreases in the proportion of children and increases in the proportion of working-age and old-age population are anticipated in all Latin American regions. Middle America is the only Latin American region in

which the proportion of children is expected to be larger than 40 per cent by 2000.

The African regions, excluding Northern Africa, are the only developing regions in which the proportion under 15 years of age would further increase between 1970 and 2000. In Northern Africa, it is expected that substantial fertility declines will distinctly reduce the proportion of the young population. In all African regions, again excluding Northern Africa, the proportion of the population in the ages of economic activity is likely to decrease between 1970 and 2000. However, with regard to the proportion of those in old-age groups, it is expected to increase slightly in all African regions, excluding Southern Africa.

RESULTS OF THE REGIONAL CONSULTATIONS SUBSEQUENT TO THE WORLD POPULATION CONFERENCE

United Nations Secretariat *

INTRODUCTION

Background information

The principle of intergovernmental consultation at the regional level had been applied as part of the preparatory work for the World Population Conference in the series of meetings held under the auspices of the regional commissions [1] in the period April–May 1974.[2] The World Population Plan of Action [3] adopted at Bucharest endorsed the principle as one of the means of ensuring an appropriate response to the Plan. Subsequently, the General Assembly, in its resolution 3344 (XXIX) of 17 December 1974 called, inter alia, upon the Population Commission, the United Nations Fund for Population Activities (UNFPA) and the regional commissions, to consider how best they could assist in the implementation of the Plan of Action. Further, in the consultations preparatory to the Conference, proposals had been made to convene post-Conference meetings early in 1975.

The post-Conference consultations [4] organized by the United Nations, through the Population Division of the Department of Economic and Social Affairs, and by UNFPA, in collaboration with the regional commissions, were held as follows:

(a) For the region of the Economic and Social Commission for Asia and the Pacific (ESCAP), at Bangkok, Thailand, from 14 to 20 January 1975;

(b) For the region of the Economic Commission for Latin America (ECLA), with the Centro Latinoamericano de Demografía (CELADE) collaborating, at Mexico City, from 3 to 7 March 1975;

(c) For the region of the Economic Commission for Africa (ECA), at Lusaka, Zambia, from 16 to 22 April 1975;

(d) For the region of the Economic Commission for Western Asia (ECWA), at Doha, Qatar, 24 and 25 March 1975; and at Beirut, Lebanon, 1 and 2 May 1975;

(e) Among the countries of the region of the Economic Commission for Europe (ECE), at Geneva, from 7 to 11 July 1975.[5]

Consequently, during the period from April 1974 to July 1975, Governments in all five regions consulted twice on the World Population Plan of Action, in addition to participation in the World Population Conference at Bucharest.

Participation

The post-Conference consultations were attended by representatives of Governments of States members and associate members of the regional commissions, and by a limited number of observers from non-member Governments which requested invitations. The level of representation varied from the ministerial level of the ECLA region to middle-level government functionaries in some regions or countries therein. Countries represented at both the pre- and post-Conference consultations are listed in annex I.

The United Nations bodies working in the field of population were represented in terms of the relationship agreements between the United Nations and the agencies. A number of non-governmental organizations in consultative status with the Economic and Social Council and of intergovernmental organizations were invited to send observers, in response to requests.

Documentation

Annex II lists the main papers presented to each meeting; basic information on the regional demographic situation, and trends and regional approaches to population in the development context were prepared by the regional bodies. The documentation for the European meeting was exceptional because of the comprehensive scope of the paper by the ECE secretariat and because of the information available on population policies in countries of the region. In addition to the papers listed

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* Population Division of the Department of Economic and Social Affairs.

[1] Owing to the nature of the mandate of the Economic Commission for Europe in the field of population, the consultation among countries of that region was convened by the United Nations in co-operation with the Executive Secretary of ECE.

[2] See "Reports of the regional consultations preparatory to the Conference" (E/CONF.60/CPB/34).

[3] Report of the United Nations World Population Conference, 1974, Bucharest, 19–30 August 1974 (United Nations publication, Sales No. E.75.XIII.3), chap. I, para. 107.

[4] The reports of the consultations are as follows: for the Economic and Social Commission for Asia and the Pacific, E/CN.11/1208; for the Economic Commission for Latin America, ST/ECLA/CONF.54/L.9/Rev.1; for the Economic Commission for Africa, E/CN.14/POP/136; for the Economic Commission for Western Asia, E/ECWA/POP/CONF.2/11; for the Economic Commission for Europe, ESA/P/AC.5/5 and Corr.1.

[5] This consultation, like the pre-Conference consultation, was convened by the United Nations, in co-operation with the Executive Secretary of the Economic Commission for Europe.

in annex I, the consultations (except in Europe) received statements from Governments; however, these statements varied greatly from region to region in number and in scope.

An important additional component of the documentation in the four developing regions was the series of statements submitted by United Nations agencies working in the field of population, outlining the response of those bodies to the recommendations of the World Population Conference, and especially to the World Population Plan of Action, and the relevance of their programmes to the countries of each region.

Purpose of the consultations

It was hoped that the consultations would yield information on specific government policies and action programmes recommended in the World Population Plan of Action, to guide the United Nations and UNFPA on the types and levels of substantive, human and financial support required to respond to national, regional and global needs, with an indication of priorities attached to the various fields referred to in the Plan.

What has emerged from the consultations mainly takes the form of recommendations at the regional level on the rationale of population policies; the areas to be addressed by policies; the inputs for formulating, implementing and evaluating them; and the need for international co-operation. Again, the meeting in Europe was exceptional: something in the nature of an examination of conscience on recent demographic trends and implications of possible continuation of fertility decline, which gave pause for thought but not for definite policy conclusions.

Relationship to the pre-Conference consultations

At the pre-Conference consultations, each region gave its reactions to the draft of the World Population Plan of Action and offered proposals for changes, many of which were incorporated in one way or another in the final version. Although the consensus at Bucharest was reaffirmed, application has required further consideration by countries and sometimes by regional bodies of different levels of responsibility. The process was related to the evolution of ideas from the pre-Conference period and to the conceptual problems in the post-Conference period on the means of integration of population policies in development planning:

(a) The countries of the ECE region have avoided anything resembling recommendations on population policies; nevertheless, the post-Conference consultation was informed by a sense of common understanding, recognition of some common problems, current and potential; and a foreshadowing by a number of Governments of announcements of considered positions as a result of the adoption of the Plan of Action;

(b) In the ESCAP region, a defined position on population control was established before the Conference; and some concessions were made at Bucharest in the interests of international solidarity, with a subsequent reaffirmation of the pre-Conference position with a modification of its rationale in the development context;

(c) In the ECLA, ECA and ECWA regions, there was essential continuity of positions throughout, with more elaboration, especially in the ECLA region, as a result of the Conference. In the ECLA and ECA regions, the emphasis on the problems of development and the international aspects thereof reflects the importance attached to the New International Economic Order in the post-Conference consultations.

In the case of the ESCAP region, the New Delhi Declaration (resolution 154 (XXXI) of March 1975), though subsequent to the post-World Population Conference consultation, elaborates an authoritative regional reaction to the New International Economic Order in which rapid rates of population growth are seen as one of the problems causing or aggravating difficulties in the achievement of development objectives.

In the case of the ECA region, the resolution on "Integrated programmes on population" (E/CN.14/Res/273 (XII)) adopted by the Third Conference of African Ministers in February 1975 (which appears as annex III to this article) must be taken into account as another authoritative statement bearing directly on issues discussed in the consultation; and, in effect, endorsing action to reduce population growth by those countries which consider the current rate too high and endorsing the right to responsible parenthood.

Presentation of the recommendations of the post-Conference consultations

The findings of the post-Conference consultations are presented by region and in the order followed in the Plan of Action. Where possible, objectives and measures are distinguished, with an attempt to reflect the reasoning behind the positions adopted.

However, for some topics and for the European meeting, the presentation could not conveniently be standardized in this way. At the consultation in Europe, interactions among demographic variables and also multiple reactions among these and socio-economic variables were so stressed that it was not easy to isolate particular demographic variables. In the other regions, the problem was incidental to internal procedures in the meetings and to variations in the detail of the reports which made it difficult to do equal justice to the underlying arguments. The ECLA report is a comprehensive progression from normative considerations, to juridical and institutional instruments for population policies, to objectives and goals and thence to recommendations for action. The ESCAP and ECWA reports are concise statements of areas addressed and recommendations for action. In the case of the ECA meeting, the report must be read in conjunction with the background paper "Proposals for a population programme of action for Africa following from the recommendations of the 1974 World Population Conference" (E/CN.14/POP/135), the former being essentially an elaboration and clarification of the latter, together pre-

senting both recommendations for action and the arguments underlying them.

RECOMMENDATIONS FOR ACTION BY GOVERNMENTS

Population goals and policies

Population growth

Among countries of the ECE region

At the consultation among countries of the ECE region, it was observed that for a number of reasons most countries in the region had not regarded their declining rates of population growth as alarming and that they had, *de jure* or *de facto,* permitted growing freedom in respect of control of fertility. Yet, the consultation recognized the implications (highlighted by the lower projection in the ECE paper on post-war demographic trends (ESA/P/AC.5/2)) of a possible decline in absolute numbers from around the turn of the century. A few countries had already modified their positions on population growth, and the consultation raised the question whether in the future Governments might see a need to take pro-natalist action, perhaps in ways not reconcilable with their customary support of individual freedom of action in this domain.

The socio-economic consequences of recent demographic trends were serious issues, and questions were raised regarding oscillations which could occur in the course of demographic change, and which could require successive adjustments in such areas as school-building programmes, housing, urbanization and migration, levels of living and employment.[6]

Though the implications of growth of world population were not discussed in any detail, reference was made to the seriousness of the long-term problem of food supply in relation to the growth of population and of the short-term danger of intermittent periods of acute shortage.

In the ESCAP region [7]

As had been recommended at the pre-Conference consultation in the ESCAP region, the post-Conference consultation reaffirmed its support of quantified and dated targets for the reduction of population growth "in the interests of all nations and the common good". Those targets went beyond the regional level, recommending that the goals should be the reduction of population growth rates by 1985 to an average of 1.7 per cent for the world, an average of 0.6 per cent for the developed countries and an average of 2.0 per cent in the developing countries. It may be recalled that the World Population Plan of Action used those same rates not as targets but as levels to which population growth might decline by 1985.[8]

In the discussions, representatives of Bangladesh, India, Indonesia, Iran, Malaysia, Pakistan, the Republic of Korea, the Republic of South Viet-Nam, Singapore and Thailand reported targets for reduction of population growth (in a few cases, they expressed them in terms of reduction of fertility) adopted on the grounds that population growth was hampering goals of promoting human welfare. The World Population Conference, however, had reinforced a growing opinion in many of the countries that success in achieving demographic objectives required broad action in the socio-economic field and that opinion was reflected in recommendations on socio-economic policies made by the consultation.

In the ECLA region

The consultation in the ECLA region emphasized the distinction between an equal need for action in respect of critical situations arising from the interaction of socio-economic, political and demographic structures and critical situations deriving from the demand for services generated by population dynamics, with particular emphasis on demand for education, health services, housing and other facilities clearly related to the trends of population growth, distribution and structure.[9]

Although it was recognized that the high density and rapid population growth had created critical situations in some countries where rates of economic growth had not kept pace with population growth,[10] it was also noted that most of the instruments of action adopted by Governments in the region were "primarily aimed at achieving social and economic objectives while also affecting the population variables"; others had been devised "mainly to influence population dynamics and supplement the former".[11]

In the ECA region [12]

In the ECA region, it was recognized that in some cases, particularly in countries with vast natural resources, a high rate of population growth could provide added benefit for development through a large supply of labour and an expanded domestic consumer market".[13] This approach reflected the emphasis placed upon questions of national development, international equity and economic co-operation. However, the possibility that rapid population growth could be an obstacle to development was also recognized, and resolution 273 (XII) of the Conference of Ministers in 1975 spelled out the right of countries to take action to reduce population growth if it was believed to be such as to hamper development.

In the ECWA region [14]

In the view of the consultation in the ECWA region, "rapid population growth in the area does not consti-

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[6] ESA/P/AC.5/5 and Corr.1, para. 45.
[7] E/CN.11/1208, paras. 20, 23 and 24.
[8] *Report of the United Nations World Population Conference, 1974,* chap. I, para. 16.

[9] ST/ECLA/CONF.54/L.9/Rev.1, paras. 153-56.
[10] *Ibid.,* para. 157.
[11] *Ibid.,* para. 160.
[12] E/CN.14/POP/135, paras. 9-12 and E/CN.14/POP/136, paras. 27-29.
[13] E/CN.14/POP/135, para. 10.
[14] E/ECWA/POP/CONF.2/11, paras. 16 and 18.

tute an obstacle in the way of socio-economic develop-
ment. In essence, the question of growth is a question
of development and optimum utilization of available
and potential resources and capacity which can absorb
population growth in the region".[15] It was also indi-
cated that the development process might overcome the
implications of the continued rise in reproduction rates
and the natural increase of population.

Morbidity and mortality

Among countries of the ECE region

The increasing proportion of the aged in the ECE
region had tended to halt or even reverse the decline
in the crude death rate, and levels of mortality among
infants and children were nearing the limit of improve-
ment. There was an implicit recognition that the chang-
ing age structure would require measures for the attain-
ment of uniformly high levels of life expectancy and
of differentiated care for the diseases and general wel-
fare of the aged.

Note was taken of the fact that in four countries
there were no legal grounds for abortion.[16] In the other
countries, the grounds for abortion varied greatly, but
the tendency had been towards greater freedom; and, in
three countries, there had been a reintroduction of
restrictions.[17]

In the ESCAP region [18]

In the ESCAP region, targets were set as follows:
countries with the highest mortality levels should have
as their objective, by 1985, an expectation of life at
birth of 62 years, a maternal mortality rate of not more
than 210 per 100,000 live births and an infant mortal-
ity rate of less than 120 per 1,000 live births.

The World Population Plan of Action,[19] although
proposing the same target for infant mortality, set a
target of "at least 50 years" for the expectation of life
for countries (in all regions) with the highest mortality
and made no reference to targets for maternal
mortality.

Priorities for reduction of morbidity and mortality
were: environmental sanitation and mass immunization
campaigns; health services, including maternal and
child health, for all parts of the country; nutritional
programmes; health insurance programmes; reduction
of health risks associated with illegal abortion; and
giving of consideration to liberalization of abortion
legislation so as to lower morbidity and mortality
caused by illegal abortion.

In the ECLA region

In the context of the principle that "independently of
the realization of economic and social objectives, re-
spect for human life is basic to all human societies",[20]
the consultation in the ECLA region reiterated that
every person had the right to access to such health
services as technological development made possible
and to adequate food and health at home and at work.[21]

It was recommended [22] that countries should con-
sider some minimum objectives: reduction of general
morbidity and mortality, particularly infant, peri-natal
and maternal morbidity and mortality, with considera-
tion of the goals laid down in the Ten-Year Health
Plan of the Americas; the achievement of the goals
should be based mainly on the reduction, or, if possi-
ble, the elimination of the discrepancies between various
sectors of the population, as advocated in the Plan of
Action; reduction of malnutrition with the establish-
ment of specific objectives: (*a*) food education cam-
paigns; (*b*) improvements in food production to meet
current and anticipated needs; (*c*) supplementary nu-
tritional programmes to meet minimum requirements,
especially of infants, pregnant women and nursing
mothers.

The direct measures [23] to eliminate social differentials
include: the development of preventive medicine; ex-
tension of health services to rural areas; community
organization programmes to provide education in
health, nutrition, and environmental hygiene and to
promote community participation therein; nutritional
policies, such as enrichment of food of low nutritive
value; and programmes for potable water and human
waste disposal.[24]

In the ECA region [25]

Targets specified in the background paper for the
ECA region proposed achievement of an expectation of
life of not less than 65 years by 2000, and an infant
mortality rate of fewer than 80 per 1,000 live births
by 2000 (or at least a gain of 20 years in life expect-
ancy at birth by 2000). These goals were regarded by
some participants in the consultation "as rather arbi-
trary and unrealistic due to a weak data base", but no
alternatives were proposed. There was consensus that
countries should have as their objective a rapid reduc-
tion in morbidity and mortality, and the international
community was urged to offer "maximum assistance
possible" in this regard.

Measures proposed or implicit included action pro-
grammes in the field of health, especially in rural areas;
emphasis on preventive rather than curative medicine;
need for comprehensive maternal and child health

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[15] *Ibid.,* para. 16.
[16] Though it would appear more suitable to treat abortion
as an aspect of reproductive behaviour, it is included here to
correspond with the placement in the World Population Plan
of Action, para. 24(*b*), which fits better the positions of the
developing than the developed countries.
[17] See Dirk J. van de Kaa, "Population policies in Europe
and North America" (ESA/P/AC.5/4), paras. 60-62.
[18] E/CN.11/1208, paras. 25-26.
[19] *Report of the United Nations World Population Confer-
ence, 1974,* chap. I, para. 23.

[20] *Ibid.,* chap. I, para. 14(*e*).
[21] ST/ECLA/CONF.54/L.9/Rev.1, paras. 124-125.
[22] *Ibid.,* para. 151.
[23] *Ibid.,* para. 162.
[24] See also reference to sub-fertility and sterility in the sec-
tion below on "Reproduction, family formation and the status
of women".
[25] E/CN.14/POP/135, paras. 17-23; and E/CN.14/POP/136,
paras. 33-40.

services; reduction of cost of medical services to individuals; raising the levels of nutrition, with emphasis on local foods; transnational co-operative programmes for the control of specific diseases; health measures to control involuntary sterility and sub-fecundity; abortion, though possibly contrary to African ideals and values, was given qualified approval on the grounds of health and where the survival of either mother or child, or both was threatened (in this case, facilitating legislation should be enacted).

In the ECWA region [26]

At the consultation for the ECWA region, note was taken of the continued high mortality rates and relatively low expectation of life at birth; and of the persistence of endemic diseases, especially among infants and children, in some parts of the region.

Priority action was suggested to reduce mortality, particularly among infants and children.

The measures suggested included accelerated efforts to promote and extend the services of mother and child health centres; more rapid implementation of health security; development of medical and health centres to eradicate contagious and endemic diseases; comprehensive planning of health services at local level; and use of paramedics.

Reproduction, family formation and the status of women

It was observed that responsible parenthood played two distinct roles, appearing:

(a) *As a fundamental human right.* All regions endorsed the principle, but it was not made explicit in the ESCAP region. There was agreement: (i) in seeing its application as a means to ensure the health and welfare of the mother and children or of the family in general; (ii) in favouring the implementation of measures, such as education, information and availability of means to enable couples to exercise the right; (iii) in urging Governments and the international organizations to provide the requisite assistance;

(b) *As an instrument of population policy.* The outstanding position was that of the ESCAP region, where the reduction of fertility and/or of population growth was viewed as a major objective of population policy and family planning as a major means of attaining the objectives.

In the other regions, no such emphasis was evident on the reduction of fertility through the exercise of responsible parenthood. The proposals neither excluded nor promoted official action for fertility reduction, and naturally so, because official attitudes differ from country to country. In Europe and in the ECLA consultation, it was stated that the rights of couples in respect of fertility should not be restricted in any way to satisfy an objective of demographic policy.[27]

All regions acknowledged the interrelations between reproduction, family formation and the status and roles of women, the most complex formulation being in Europe, where low fertility levels and manpower shortages in some countries were compensated by international migration of workers and/or by increasing participation of women in the labour force.

Among countries of the ECE region

Changes in age structure, in age at marriage and in nuptiality in general had been responsible for short-term fluctuations in crude birth rates in the post-war period, but the dominating feature was seen to be the downward trend in completed family size. Rising educational levels of women and their greater participation in economic activities, together with the new concept of women's role in society, were important; but the motivation of most couples to restrict their number of children to one or two, or at most three, was still inadequately known. The evidence appeared to indicate that economic, social, cultural and psychological factors were more decisive than contraceptive methods in influencing fertility. However, divergent opinions were expressed about the likely effects under modern conditions of shorter term or longer term economic fluctuations upon fertility. It was acknowledged that this relationship was highly complex, depending upon a number of sociological and psychological factors, the effects of which were difficult to foresee.[28]

In the ESCAP region [29]

In the ESCAP region, the objective was to promote family welfare as well as to lower fertility.

The recommended measures included: (a) improvement of management of family planning programmes in respect of supply and distribution of contraceptives, especially to rural areas; establishment of family planning clinics in public places; and integration of all available field extension personnel, all suitable private organizations, local committees and service units in industry; (b) direct incentives to keep the family size small; (c) reduction of sterility and sub-fecundity; (d) establishment of legal minimum age at marriage, taking into account economic and social conditions and cultural values.

In this connexion, the ESCAP consultation reaffirmed its pre-Conference recommendation specifying the following goal: "that all countries ensure availability, to all persons who so desire, the necessary information and education about family planning and the means to practice it effectively and in accordance with their cultural values and religious beliefs, if possible by the end of the Second United Nations Development Decade, but not later than 1985".[30] It also reinvited countries with very high birth rates to reduce them by 10 per

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[26] E/ECWA/POP/CONF.2/11, para. 17.
[27] ESA/P/AC.5/5 and Corr.1, para. 52; and ST/ECLA/ CONF.54/L.9/Rev.1, para. 127.

[28] ESA/P/AC.5/5 and Corr.1, para. 56. See also the reference to abortion in the preceding section on "Morbidity and Mortality".
[29] E/CN.11/1208, paras. 20 and 27-35.
[30] *Ibid.*, para. 27.

1,000 before 1985 and to try to reach replacement levels of fertility in two or three decades or as soon as possible; the goal of developed countries should be to attain replacement levels of fertility by 1985 and near-stationary population growth as soon as practicable.

In the ECLA region

The objectives in the ECLA region were protection of the family as the basic unit of society by appropriate legislation and policy; preparation of the social and economic conditions for the exercise of the right to responsible parenthood and to achievement of desired family size, irrespective of demographic goals; and complete integration of women in the development process.[31]

In respect of measures to be implemented, attention was drawn to the possible impact on fertility of the attainment of a fundamental development objective, such as the full-scale incorporation of women in economic, social and political activity; and, consequently, to the juridical measures and the programmes and actions that were conducive to that end.[32]

Stress was also placed on the effect on fertility of higher levels of living, especially improved education. More specifically, attention was drawn to the following forms of action: development of maternal and child health services and family planning services; measures designed to raise fertility levels, such as special marriage and birth grants; specialized medical services which would help to eliminate the causes of sub-fertility and sterility and to reduce general and infant mortality.[33]

Educational programmes should be expanded so as to reduce or eliminate real and functional illiteracy and to ensure that better use was made of the human and natural resources of the countries of the region.

In the ECA region [34]

The objectives in the ECA region were to raise and sustain the quality of family life; to safeguard African cultural values and practices in regard to marriage and the roles and status of family members; and to secure that couples attain the size of the family appropriate to the achievement of a high level of living.

The consultation recommended measures to include: (a) family planning services in maternal and child health services; (b) integration of health and nutrition programmes and implementation of such programmes through practical social and economic measures; (c) promotion of the status of women and their participation in educational, social, economic and political activities; (d) greater efforts to secure paid employment of women in both urban and rural areas; (e) action to ensure free choice of couples in marriage;

(f) establishment of minimum ages at marriage for men and women for socio-economic and health reasons; (g) definition and guarantee of rights of widows, widowers, divorcees and of their children, as well as of illegitimate children; (h) evolution and strengthening of social development policies; (i) protection of the young and elimination of child labour; and (j) strengthening of ongoing population programmes in some countries of the region.

In the ECWA region [35]

In the ECWA region the objectives were to obtain more adequate understanding, through data collection and research, of the interrelations between reproduction and the socio-economic and cultural levels of the family and individuals in order to formulate policies and programmes; to secure the exercise of the right to responsible parenthood; to promote the role and status of women and their full participation in economic and social life.

The measures recommended were: (a) inclusion of family planning services in integrated health programmes; (b) co-operation between countries in the region supported by international organizations, especially to extend family planning services through maternal and child health services; (c) promotion of the education of women, as well as of males; and (d) increase in women's participation in economic activities.

Population distribution and internal migration

Among countries of the ECE region

The consultation among the countries of the ECE region did not consider this question as a separate issue, but it did take note of some aspects related to it. For example, in some instances, high (over-all) densities were a factor in moderating any objections Governments might have had to declining fertility and population growth, and higher rural fertility had until recently compensated for lower urban fertility. In the latter instance, there was no certainty that such a compensatory effect would operate in future.[36]

In the ESCAP region [37]

In many countries of the ESCAP region, rural-urban migration and maldistribution of population had become urgent national problems. Though people should be able to move freely within national boundaries, the following measures should be considered: (a) relocation of existing industries and location of new industries in rural areas; (b) resettlement of urban squatters; (c) decongestion of primary cities through rural development and the establishment of regional urban growth centres; (d) identification, development and opening up of public lands for resettlement; (e) land reforms to improve life in rural areas; (f) provision of information, incentives, avenues of productive employment and

[31] ST/ECLA/CONF.54/L.9/Rev.1, para. 126.
[32] Ibid., para. 163.
[33] Ibid., para. 164.
[34] E/CN.14/POP/135, paras. 24-31; and E/CN.14/POP/136, paras. 41-54.

[35] E/ECWA/POP/CONF.2/11, paras. 18 and 19.
[36] ESA/P/AC.5/5 and Corr.1, para. 55.
[37] E/CN.11/1208, para. 36.

income for people in rural areas which might induce them to remain and to participate in the socio-economic development of those areas; and (g) settlement of no-madic populations.

In the ECLA region [38]

In the ECLA region, the minimum objective was to influence the scatter of the population, migratory movements, population spread and excessive urban concentration by means of comprehensive agrarian, regional and urban development programmes, in line with the countries' interests and within the context of their over-all economic and social development strategies.

In order to attain those general objectives, the following specific objectives were recommended: (a) to promote the grouping of the geographically scattered population through the establishment of communities equipped with the basic services necessary for their over-all development; (b) to adapt population spread to the possibilities and requirements of regional development, on the basis of special human settlement programmes; (c) to take action to establish and further develop groups of small and medium-sized towns in order to bring urban trends into balance and to improve the planning of urban and rural population centres so as to ensure the efficient provision of public services; (d) to reorient migration movements from the countryside to the towns by eliminating their causes and respecting at all times the right of freedom of movement and residence within the territory of each State; (e) to encourage people to remain in their place of origin by means of economic and social incentives conducive to its over-all development; and (f) to harmonize internal migratory movements with the requirements of the regional development of each country.

It was pointed out that some countries of the region had adopted some policies and measures to reduce and orient rural-urban migration, to stimulate the growth of medium-sized cities and to occupy territorial space:

(a) Regional development policies: administrative regionalization and demarcation of economic zones; promotion of development centres; regional industrialization policy; priority development of the services infrastructure in the less developed zones.

(b) Rural development and agrarian reform policies: transformation of land tenure structures; transfer of economic resources to the agricultural sector and promotion of agro-industry; financial and technical support for small-scale and medium-scale industry situated in rural areas; programmes aimed at concentrating the scattered rural population so as to facilitate its access to services and raise its level of living; specialized training programmes for improving the skills of the agricultural labour force.

(c) Land settlement programmes, including the bringing of new land under cultivation.

In the ECA region [39]

In the ECA region, the objectives set forth were to promote uniform economic development and to protect the rights of resettled persons and of migrant workers and their families.

The measures specified included: (a) establishment of economic growth centres with adequate facilities for education, sanitation and other social services; and (b) formulation and implementation of rural development programmes with attention to diversified agricultural development, conservation of agricultural resources, land reform and organization of production and marketing, the decentralization of appropriate industries to provide employment opportunities and provision of housing, education and other services designed specifically for rural development needs.

In the ECWA region [40]

The objectives stated at the consultation for the ECWA region were to narrow the gap between rural and urban areas in all fields in order to offset the negative effects of internal migration, and to collect data and conduct research on the interrelationship between development and geographical distribution of population.

The measures recommended were: (a) to build up, wherever possible, the population in underpopulated areas to provide better work opportunities; (b) to establish and develop smaller and medium-sized towns in the framework of balanced development; and (c) to conduct a comprehensive survey on the economic and demographic characteristics of the bedouin, with a view to improving their conditions and making better use of their capacities.

International migration

Among countries of the ECE region

At the consultation among countries of the ECE region, several participants took note of the important influence of international migration on the attitudes of Governments towards levels and trends of population growth, in that immigration or emigration had tended to compensate for deficits or surpluses within the indigenous labour force. Moreover, as, in some countries, levels of immigration were very low where female participation in the labour force was very high, consideration should be given to the questions of labour productivity, female participation and age at retirement. There appeared to be a quantitative threshold of immigration above which socio-political tensions required intervention; and some doubts were expressed whether the benefits of international migration had not, in fact, been outweighed by their costs.

Several participants pointed to a problem of reconciling economic, social, demographic and humanitarian requirements affecting migrant workers. A number of

[38] ST/ECLA/CONF.54/L.9/Rev.1, para. 151, subparas. 5-6 and para. 61.

[39] E/CN.14/POP/135, paras. 32-36, and E/CN.14/POP/136, paras. 55-61.
[40] E/ECWA/POP/CONF.2/11, para. 20.

Governments of countries that had accepted a considerable inflow of migrant workers to supplement their labour force had limited further immigration, with the exception of families joining established immigrants. That measure had been taken either because of the probable social and psychological strain upon the immigrant, or because of the strain upon the host communities if the number of immigrants were to have increased further. In that respect, the recommendations of the World Population Plan of Action affecting protection of migrant workers were supported by the participants, though they recognized that very sensitive adjustments would be involved in seeking an equilibrium between the various factors involved.

In the ESCAP region [41]

In the ESCAP region, international migration was not regarded as a very important means of alleviating national population pressures in the region, but the "brain drain" caused serious concern because it hampered development efforts.

The objectives of policy were to stop the "brain drain" and to protect the rights of migrants and the interests of the countries concerned.

The following measures were recommended: (a) to discourage the "brain drain", suitable employment opportunities should be provided in the home countries; (b) international firms operating in developing countries should employ and train more local people and should provide them with suitable amenities, opportunities and facilities in order to retain highly skilled personnel in those countries; (c) the more developed countries should do all within their power, consistent with human rights, to discourage the inflow of highly qualified personnel from less developed countries and to encourage their return; (d) to protect and assist migrant workers and to protect the interests of the countries concerned, there should be a standardization of the skills of these workers.

In the ECLA region [42]

The minimum objective in the ECLA region was the reduction of the emigration of professionals and skilled technicians.

The measures relating to international migration in general included: (a) comprehensive planning of education and human resources; (b) investment in scientific and technical programmes; (c) adoption of other measures to adapt the training of professionals and technicians to development needs and to facilitate their incorporation in this process; and (d) establishment of international agreements to protect the interests of the less developed countries affected by the exodus of technicians and professionals.

With regard to migration between neighbouring countries, which had increased in recent years, reference was made to the following measures: (a) admin-

istrative action designed to regularize the legal status of immigrants; and (b) action designed to provide access for immigrants to social security systems.

In order to slow or reverse the "brain drain", mention was made of: (a) the drafting of legal provisions to facilitate the return of migrants to their country of origin or the admission of highly skilled aliens by granting importing facilities and installation credits; creation of opportunities for stable employment at adequate levels of remuneration; programmes of advanced training and professional specialization inside the country.

In the ECA region [43]

At the consultation in the ECA region, international migration gave rise to intensive discussion: movement across borders was frequent, often because the borders divided homogeneous ethnic groups; and the "brain drain" also was causing serious concern.

The objectives set forth were: (a) to accord first importance to the principle of national sovereignty; (b) to encourage agreements, bilateral or multilateral, which would facilitate international movement, including movement of migrant workers where the latter was significant to the national economies involved; to avoid racial considerations; (c) to protect the civil and socio-economic status of migrants in terms of internationally agreed instrument; to facilitate the settlement and rehabilitation of refugees; and (d) to discourage the "brain drain".

Such measures as the following should be adopted: (a) countries concerned with the outflow of migrant workers should promote national employment opportunities and more developed countries should assist through provision of capital, technical assistance, export markets and production technology; (b) countries receiving migrant workers should provide social welfare and other necessary services to protect them and their families; (c) those provisions should be in terms of international instruments for the protection of human rights and the elimination of discriminatory treatment; (d) laws to limit illegal migration should relate also to those inducing or facilitating such migration; (e) international co-operation on various levels should be directed to solution of problems affecting refugees, displaced persons and the outflow of skilled persons; and (f) the Governments of countries in Africa, in order to retain skilled workers and professionals, should undertake programmes to effect a better match between skills and employment opportunities, and foreign investors should employ and train local personnel and use local research facilities where possible.

In the ECWA region [44]

The consultation in the ECWA region distinguished intraregional from international migration, the former being considered "a positive phenomenon" as the

[41] E/CN.11/1208, paras. 37-38.
[42] ST/ECLA/CONF.54/L.9/Rev.1, para. 151, subparas. 7-8 and paras. 165-166.

[43] E/CN.14/POP/135, paras. 32-36, and E/CN.14/POP/136, paras. 62-66.
[44] E/ECWA/POP/CONF.2/11, paras. 21-22.

region was seen as an entity for development purposes —one labour market serving a group of culturally homogeneous states.

The objectives set forth were to relate international migration to over-all development policies, to develop population policies connected with the labour force, to stop the brain drain and to protect the rights of migration workers and their families.

The measures to be adopted were: (*a*) to proceed with planning of human resources from local to regional level; (*b*) to facilitate the movement of individuals and technical and scientific skills within the region; (*c*) to formulate a regional plan for advancing scientific skills within the framework of balanced development; and (*d*) to draft an integrated plan at the Arab level for surveying Arab skills, studying the brain drain and proposing solutions.

A category of forced migration was considered by the consultation, which appealed for international efforts for its cessation.

Population structure

Among countries of the ECE region [45]

At the consultation among countries of the ECE region, it was mentioned that if the assumptions in prospect II of the ECE paper (ESA/P/AC.5/2) were fulfilled, spectacular changes in the age distribution would occur. While the consultation considered the projection to be merely illustrative of possibilities, it highlighted the potentially serious economic and social consequences. New socio-economic approaches and provisions affecting the greatly increased proportions of aged persons would be required; the emergence of youth as a social force meant that their interests, too, would require reconsideration.

In the ESCAP region [46]

In view of the rapid increase in the already large proportion of young people in the population of most countries of the ESCAP region, the consultation strongly endorsed development strategies affording priority to the needs of children and youth. Emphasis was placed on measures to: (*a*) expand basic educational facilities and discourage child labour; (*b*) deal with school drop-outs; (*c*) prevent juvenile delinquency; and (*d*) provide more employment opportunities for young persons, including highly educated youth.

In the ECA, ECLA and ECWA regions

Measures such as those mentioned above were implicit rather than explicit in the ECA, ECLA and ECWA regions; and the discussions reflected many matters related to the structure of the population by age, sex, urban/rural distribution and industry, with special reference to agricultural and non-agricultural activities.

Socio-economic policies

All regions reaffirmed the concept of population policy as an integral part of development policy; and it is evident in the preceding sections that in all regions, socio-economic measures of various types were in operation or were proposed as conducive to improved quality of life, irrespective of the demographic impact of the measures. However, as was made clear at the consultation among countries of the ECE region in particular, the demographic impact was not to be ignored even when it could not be foreseen with any degree of reliability. Again, the consultations, recognizing also the interrelations between demographic, economic and social change, were conscious of the impact that demographic change might have on development, which, as in the reverse case, could not be foreseen with any certainty.

The socio-economic measures most emphasized by the developing countries were related to health; food and nutrition programmes, education, employment, information and services related to responsible parenthood; regional planning and rural development. At the same time, those measures supported directly and/or indirectly the attainment of various demographic objectives. The protection of the environment and the practice of economy in the use of natural resources were related issues recognized but not dealt with in any detail. It was only in the ESCAP region that the socio-economic objectives and measures were separately enumerated: a more equitable distribution of opportunity and income; and full employment for both males and females.[47] Appropriate levels of social security might be achieved by the following means: (*a*) implementation of subnational development measures; (*b*) use of labour-intensive techniques of production; (*c*) mobilization of rural manpower through small-scale and medium-scale industries; (*d*) promotion and strengthening of farmers' associations and rural co-operatives; (*e*) provision and strengthening of social welfare measures, especially for the poor and the aged; (*f*) protection of adopted children and rehabilitation of underprivileged children; and (*g*) provision of day-care centres to enable women to enter the labour force.

In terms of the consensus reached at the World Population Conference and in the light of other international strategies, such as the New International Economic Order, achievement of development aims should be based both on national sovereignty and on international solidarity in an increasingly interdependent world. It was in the ECLA [48] and ECA [49] regions that questions of interdependence were given most intense consideration, and it was there that the need for international economic co-operation to secure justice for all and equality as between developed and developing countries was most keenly felt. A corollary of that view was that national Governments, in formulating policies

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[45] ESA/P/AC.5/5 and Corr.1, paras. 36-40.
[46] E/CN.11/1208, para. 39.

[47] E/CN.11/1208, para. 40.
[48] ST/ECLA/CONF.54/L.9/Rev.1, paras. 120-123.
[49] E/CN.14/POP/136, paras. 25-28.

in the economic and social field, including population policies, should take into account possible repercussions at the international level.

Promotion of knowledge and policies

Data collection and analysis

Among countries of the ECE region

At the consultation among countries of the ECE region, there were no formal references to the needs for data nor to the methods of collecting them; however, it was clear from the many references to research, dealt with in the next section, that modifications of the data base or in the utilization of existing data were necessary if the research recommendations were to be fulfilled.

In the ESCAP region [50]

In the ESCAP region, priority was accorded to: (a) censuses in those countries which had not carried out a first or a recent census; (b) supporting analysis and publication of census data; (c) provision of support to sample surveys; (d) support to continuous study of multipurpose household surveys; (e) support to vital registration projects; (f) improvement of medical data in vital registration; (g) provision and improvement of computer facilities for analysis of demographic data; (h) development of administrative records as data sources; (i) organization of national and subregional seminars and workshops to increase awareness and utilization of population data; (j) provision of appropriate incentives to retain computer-trained personnel in the public sector; (k) participation in the World Fertility Survey; and (l) collection of data on income distribution in relation to family size.

Population data collection and analyses should give particular attention to data essential to development planning and to formulation of population policies.

In the ECLA region [51]

The consultation for the ECLA region found that there was a clear need to improve the quantity, quality, coverage, periodicity and timeliness of the requisite data to be furnished systematically and as judged appropriate by Governments, especially as a basis for population policies.

The consultation considered that, to meet that need, efforts should be made: (a) to ensure greater continuity in the work of preparing, taking and publishing censuses; (b) to test new methods for carrying out census operations; (c) to review existing machinery for the formulation of international recommendations in the carrying-out of censuses, account being taken of differing national circumstances and of the need for the data necessary for formulating, implementing and evaluating population policies which would, at the same time, permit comparative intercountry analyses to be made; (d) to establish regular channels, as agreed upon by the Governments, for consultation between producers and users to ensure that the information provided should be suited to the needs of the latter; and (e) to promote the exchange of experiences in that field between countries.

It was recommended that, in addition to continuing their efforts to improve their vital and other current statistics, countries should give particular attention to obtaining such data from population sample surveys.

In the ECA region [52]

In the ECA region, the needs for data were regarded as fundamental to deriving indicators of the state of the economy and as basic to formulation, implementation and evaluation of policies and programmes.

The first priority was a population census between 1975 and 1985, taking advantage of the services of the African census programme, and with at least a decennial periodicity in future.

Governments should develop national capabilities for household surveys of various demographic and other related socio-economic variables of relevance to the improvement of levels of living and the general welfare of the community. The survey programmes, which should be planned on a long-term and regular basis, should also focus on fertility, mortality and migration as important elements of the dynamics of population change.

Countries were urged to establish or improve their vital registration systems as a long-term objective beginning with sample registration areas.

The view was expressed that the scope of data collection should not be limited to data that were essentially demographic in character. It was, for example, essential to have data that could facilitate the measurement of the effects of social policies pursued by Governments on the population, especially in the rural areas.

Countries were urged to utilize to the fullest extent existing collaborative arrangements and assistance offered by both national and international donor agencies and organizations.

In the ECWA region [53]

The objectives set forth at the consultation for the ECWA region were: (a) to devote special attention to methods of demographic data collection, classification and publication; (b) to pay attention to the organization of civil registration, improve the registration of vital events and enact appropriate laws to facilitate this work; (c) to draw up a regional programme of data collection, including the necessary arrangements for organizing and conducting comprehensive censuses, sample surveys and specialized surveys, and for evaluating and analysing the results, on the basis of standardized concepts, questionnaires and tabulations; (d) to utilize and develop demographic analysis techniques

[50] E/CN.11/1208, paras. 41-42.
[51] ST/ECLA/CONF.54/L.9/Rev.1, paras. 136-138.
[52] E/CN.14/POP/135, paras. 49-55, and E/CN.14/POP/136, paras. 67-70.
[53] E/ECWA/POP/CONF.2/11, para. 23, subparas. 1-8.

for extracting population indicators and direct special attention to benefiting from defective data and to use direct and indirect methods for that purpose; (e) to conduct periodic censuses, at least once every 10 years, and create a permanent government body in each country to supervise census operations; and (f) to strengthen and support central statistical systems and establish and develop statistical units in various government agencies.

Research

It cannot be doubted that the World Population Plan of Action has had a profound effect on the focus of thinking in the area of research: in every region, the consultation gave emphasis to the priority attached to research as a basis for formulation, implementation and evaluation of policies affecting demographic behaviour, whether direct or indirect in their operation, and research on the integration of population programmes in development planning. It is worth noting that the countries of the ECE region, relatively advanced as they are in the demographic transition and in their levels of development, were explicit in their concern for greater knowledge of multiple relations as well as of the interaction of particular demographic and socio-economic factors as a basis for action, particularly in view of possible reversals of or fluctuations in trends. Indeed, in every region, recognition of the reciprocal effects of population and socio-economic variables underlay the emphasis on investigation of interrelationships between factors.

All regions supported the principle of promotion of national research activities and the sharing of research findings; strong support was also given to research at the regional level. Further, as concerns Europe, an expanding role for the Economic Commission for Europe was recommended in the resolution adopted by the consultation, the text of which is attached as annex IV to this paper. In the case of ECLA, proposals for research by ECLA and CELADE on the demographic areas discussed in the World Population Plan of Action included also a number of specific suggestions for studies and research related to the integration of population policies into regional development strategies and policies.[54]

It may be mentioned in this connexion that the recommendations for implementation of the World Population Plan of Action regarding monitoring of population trends and policies and review and appraisal of the Plan [55] require more extensive research into the demographic variables and into national policy formulation and implementation.

Among countries of the ECE region

Several major research themes pervaded the discussions in the consultation among countries of the ECE region: (a) the interrelations between the various factors determining the trend towards declining fertility,

and the possibilities of changing patterns of family building and of oscillations in fertility levels; (b) the elucidation of differentials in mobidity and mortality within countries with regard to sex, socio-economic and ethnic groups, regions, urban and rural areas and environmental factors; and (c) the relationships between availability of manpower, rates of population growth, benefits and costs of permitting a compensatory immigration, potential compensation of greater participation of women in the labour force, and the demographic, social and economic implications of a dual role for women, as mothers and workers. Continuing research was recommended on the interrelations between population, the environment and natural resources, and between population and international migration.

In the ECLA region [56]

At the consultation for the ECLA region, in considering research requirements for the formulation and evaluation of population policies, recommendations were made for the conduct of:

(a) Biomedical research to develop means of improving health conditions, and especially of reducing maternal mortality, peri-natal mortality and mortality among children aged 0–4 years; to evaluate existing contraceptive methods and to develop better methods and to improve procedures for the diagnostics and treatment of sterility; supported by operational research to evaluate the efficiency of various ways and means of providing health services for the population, especially in respect of maternal and child health;

(b) Social research in which priority should be given to research directed to establishing the interrelationships between population and development in specific historical contexts, particularly where that would make it possible to identify the effects produced and to anticipate probable future effects of different modes or patterns of development on population dynamics. Research relevant to the formulation and evaluation of population policies in the relatively less developed countries should be encouraged.

In the ESCAP region [57]

In the ESCAP region, priority was given to research into the implementation and evaluation of family planning programmes and the interrelationships between population and socio-economic variables. Specific areas to be investigated were: (a) factors inhibiting acceptance of family planning; (b) interrelations between fertility and development; (c) social and psychological determinants of family size; (d) feasibility of incentive schemes to encourage reduction in family size; (e) studies on unwed mothers and illegitimate children; (f) development of methods for population model-building; (g) determinants and consequences of internal migration; (h) reliability and safety of alternative contraceptives; (i) various aspects of mortality; (j) alternatives

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[54] ST/ECLA/CONF.54/L.9/Rev.1, para. 167.
[55] Report of the United Nations World Population Conference, 1974, chap. I, paras. 107-108.

[56] ST/ECLA/CONF.54/L.9/Rev.1, para. 139.
[57] E/CN.11/1208, para. 43.

to basic food staples; (*k*) social consequences of contraceptive practice; (*l*) methods for integrating population inputs and goals in development plans and programmes; (*m*) review and analysis of laws that bear on population factors; and (*n*) methods of fertility regulation and of correcting sterility.

In the ECA region [58]

The consultation for the ECA region stated that research in the field of population should be intensified if population policies, as an integral part of development policies, were to have the desired impact on the development process in the continent. Among the areas requiring special attention were: (*a*) patterns, trends and differentials in morbidity, mortality, fertility, population distribution and migration; (*b*) attitudes towards family size, family planning and factors affecting its operation and success; (*c*) interrelationships between population variables and socio-economic development; and (*d*) population policies and factors influencing their formulation and implementation. Traditional medicine was an additional area proposed, and the consultation expressed the view that research should, in so far as possible, be oriented to African development problems, with special emphasis on rural development.

In the ECWA region [59]

The deficiency in the field of collection and analysis of demographic data in the ECWA region had limited the fields of research undertaken. Despite some of the initiatives in that domain, research work had not yet dealt with many problems except casually, for example, the relationship between demographic variables and other socio-economic variables, or the determinants of fertility or mortality levels, or research on the Arab brain drain and other matters. It was therefore recommended that research should be undertaken on the levels and trends of demographic variables and their interaction from the standpoint of their effect on the level and nature of economic development and the effect of development on them; and on integration of population policies in economic and social development strategies.

Management, training, education and information

Management

The need for strengthening the infrastructure for management of population programmes was the subject of direct reference only at the ESCAP consultation, where note was taken of the need for specialized training of family planning administrators. However, the importance of management was implicit in the many references to implementation of policy decisions and especially in the functions attributed to the high-level

national units to formulate and administer population policies proposed by the ECLA consultation. [60]

Training

Except in the consultation among countries of the ECE region, training was specified as an essential need, intensified by the losses of qualified personnel to other countries. Recommendations from the four developing regions covered or implied recognition of basic requirements for trained personnel for interdisciplinary, policy-oriented approaches to development planning:

(*a*) For design and conduct of field operations for the collection of demographic and other data;

(*b*) For development of other activities related to data collection and compilation;

(*c*) For publication, evaluation and analysis of data;

(*d*) For population projections and the study of their socio-economic implications;

(*e*) For research on the factors affecting demographic levels and trends and the interrelations among factors;

(*f*) For methodological studies on integration of population policies in development;

(*g*) For design, conduct, management and evaluation of population programmes designed directly to influence population variables such as the family planning programmes in the ESCAP region, or the programmes to reduce morbidity or mortality from specific causes in Africa and elsewhere); and also for personnel involved in socio-economic programmes affecting population indirectly. The latter are too numerous to count, but health, food and nutrition, education, employment and rural development programmes were strongly emphasized.

It was considered, particularly in Africa, that the aim should be to provide training at the national level; indeed, the consultation for the ECA region recommended that each country, where the need existed, should train one demographer per year for the subsequent five years so that their own nationals could take an active part in the 1980 round of national censuses. The work of the United Nations-sponsored training centres in the regions and of various other training facilities was helping substantially to fill the gap in country requirements, but extra facilities were needed in some fields.

Levels of training were another issue. For example, in the ESCAP region, the consultation saw the need for continuing efforts to provide advanced population training abroad, and the ECLA consultation recommended that the regional agencies should intensify their action to meet, *inter alia,* the shortage of high-level planners and senior-level professionals. However, the consultations did not examine systematically the whole range of levels of skills needed, Africa, in particular, being understandably concerned with acute shortages mainly, but by no means exclusively, at the middle level.

[58] E/CN.14/POP/135, paras. 56-59, and E/CN.14/POP/136, paras. 72-77.
[59] E/ECWA/POP/CONF.2/11, para. 24.

[60] ST/ECLA/CONF.54/L.9/Rev.1, para. 134 and subparas. 1-6.

Education and information

Education in matters of population was recommended as a component of formal curricula and as part of out-of-school instruction. Some reservations were expressed about the scope of sex education as such, but there was agreement, in principle, on the need for instruction in family life, health, nutrition and environmental hygiene.

In schools and universities, there should be instruction also in the role of population in development, and training programmes should be provided for those working in social and health services.

Those measures should be supplemented by information activities to cover the entire population by ways and means suited to local circumstances and cultural values. The mass media were of obvious utility, but recourse would be needed also to folk media and person-to-person communication. The objectives of those information programmes were to create awareness of matters related to population, and, in the context of endorsement of the fundamental right to responsible parenthood, to provide the information necessary to the exercise of that right. The contribution of the non-governmental organizations was considered especially helpful in that area of activity.

There were already active communications systems at the regional levels in Africa, Asia and Latin America which ensured a circulation of technical and other information to and from countries.

Development and evaluation of population policies

As previously mentioned, all five regions supported the integration of population policies in development within the framework of the World Population Plan of Action and implicitly or explicitly endorsed the allocation of responsibility to a defined entity of the Government. The ECLA consultation firmly endorsed the idea of a high-level unit of the Government with a functional relationship to policy-making bodies and with responsibilities covering formulation, implementation, evaluation and co-ordination of population activities.

INTERNATIONAL ACTION TO IMPLEMENT THE WORLD POPULATION PLAN OF ACTION

Lessons learned from the consultations

It may be asked how one can assess the results of the consultations from the viewpoint of guidance given to the United Nations and UNFPA on the types and levels of substantive, human and financial support required to help countries implement the World Population Plan of Action, and on the order of national priorities. The answer is that, although the consultations did not yield information on which to estimate with any precision levels of and priorities for support needed by countries, they did yield extensive information on the types of support needed.

In retrospect, one can perceive the difficulties confronting Governments in the context of policy formulation and implementation responsive to the World Population Plan of Action: decisions on the nature and scope of population policies are dependent upon decisions about the nature of over-all national development policy and also upon consideration of the technique of integrating population policy into development planning, so that population policies along with other sectoral strategies [61] may make their contribution to development.

The difficulty is the more acute in that approaches to development are themselves the subject of major national concern and international consultation, and the problems to be solved are both conceptual and technical. It is, therefore, worthy of note that in the consultation among the countries of the ECE region, despite the relatively advanced levels of development obtaining there, the integration of population policies in national social and economic planning was considered one of the most important conclusions drawn from the recommendations of the World Population Plan of Action, and the form of integration would "obviously vary according to the institutional structure associated with national planning in each country." [62] A further observation was that, irrespective of the formality or otherwise of the arrangements for integration, important decisions had continuously to be made with regard to changes in factors and to their feedback effects on other factors. [63] The recommendations of the ECLA consultation also revealed recognition of these problems, [64] as did the reports of the other regional consultations, though to a lesser extent.

A significant result of the consultations is the clear emergence of a theme that has some regional variations, but is essentially common to both developed and developing countries:

(a) Population policies and programmes are an integral part of national development planning;

(b) Although development factors influence demographic behaviour, the latter also affects the former;

(c) The interrelations between population and development factors are imperfectly understood, and, consequently, the effects of indirect action in the field of population (through socio-economic measures) and of direct action (through programmes directed towards affecting specific population variables) cannot be foreseen with any precision;

(d) Research on the interrelationships must be undertaken or intensified to ensure that Governments shall have a better base for: (i) formulating policies, implementing them, evaluating them; (ii) for integrating them in planning for development.

International co-operation is needed to supplement the resources of countries in need, and assistance should be provided in areas supportive to population policy and to its integration in the development context. These areas include data collection, research,

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[61] *Report of the United Nations World Population Conference, 1974,* chap. I, para. 1.
[62] ESA/P/AC.5/5 and Corr.1, para. 66.
[63] *Ibid.,* para. 73.
[64] ST/ECLA/CONF.54/L.9/Rev.1, paras. 167-169.

management, training, education and information, each of which requires recognition of the interdisciplinary nature of the broader concept of population policy endorsed in the World Population Plan of Action.

Population activities in the United Nations system

The regional consultations were not an isolated series of meetings but one of a number of developments since the World Population Conference at Bucharest, directed towards implementation of the Plan of Action. In particular, the work programmes of the Department of Economic and Social Affairs, of the regional commissions and of the United Nations agencies include many of the elements recommended by the consultations, seen from the point of view of global or regional or sectoral activities intended to serve the needs of Member States. Complementarity of the work programmes is ensured through the Administrative Committee on Co-ordination Sub-Committee on Population and at the working level by established channels of consultation. Revisions in the programme of the Department of Economic and Social Affairs, effected in response to General Assembly resolution 3344 (XXIX) of 17 December 1974, give further emphasis and extension to such areas as population and development and population policies, especially in respect of intercountry comparative studies, and, in this connexion, provide for intensified research on the interrelationships between the factors affecting demographic behaviour.

A case in point is the monitoring of population trends and policies.[65] It is, of course, essential that national Governments themselves evaluate their population policies and programmes, and the global exercise in monitoring is by no means a substitute for this; rather, it is an extended example of intercountry comparisons in respect of demographic behaviour and of formulation and implementation of national population policies.

In accordance with resolutions and decisions of the Economic and Social Council at its fifty-eighth session, arrangements are in hand for the first round of monitoring. As agreed at the eleventh session of the Administrative Committee on Co-ordination Sub-Committee on Population, the regional commissions and agencies have received requests for inputs to the monitoring of population trends specific to their areas of competence. Also according to the agreement in the Sub-Committee, a questionnaire on national population policies drafted in the United Nations Population Division has been sent to the regional commissions and the agencies for comment; after revision, the questionnaire was sent to Governments in late 1975. A report on monitoring, covering both population trends and population policies, will be submitted to the Economic and Social Council, through the Population Commission, in spring

1977. There is every reason to believe that the results will greatly clarify problems at the country, regional and global levels in formulating and implementing population policies.

In accordance with the provision of Economic and Social Council decision 87 (LVIII) of 6 May 1975, that the Population Commission contribute advice on review and appraisal of the Plan of Action and report its findings to the Council, preparatory work is being undertaken with consideration being given, *inter alia,* to the relation between the biennial monitoring of population trends and policies and the quinquennial review and appraisal of the Plan of Action.

Assistance in the population field

This article is not intended to deal with population assistance as such, a review of which is available elsewhere,[66] but merely to refer to some points which follow from the regional consultations:

(*a*) Where feasible, developing countries should endeavour to assist one another and developed countries should assist the developing countries to the extent possible;

(*b*) Multilateral and bilateral channelling of assistance should be increased, as should assistance from non-governmental organizations; the consultations endorsed the efforts of UNFPA in increasing the assistance available to Governments;

(*c*) The United Nations, its regional commissions and the specialized agencies and other bodies should assist to the maximum extent possible in their fields of competence.

Whether in terms of substantive support, or support relating to human and financial resources, there is little doubt that considerable effort will be needed for some years to come to provide the total level of assistance required by countries to achieve the objectives of the World Population Plan of Action. The framework that emerged from the regional consultations should prove useful as a guide to the international community.

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[66] See "Role of international assistance in the population fields: a post-Bucharest view" (UNFPA/WPPA/11).

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[65] *Report of the United Nations World Population Conference, 1974,* chap. I, "World Population Plan of Action," para. 107.

Annex I

REPRESENTATION AT PREPARATORY AND POST WORLD POPULATION CONFERENCE REGIONAL CONSULTATIONS

Country or area	Pre-World Population Conference	Post-World Population Conference
Economic Commission for Europe (ECE)		
Albania	—	—
Austria	x	x
Belgium	x	x
Bulgaria	x	—
Byelorussian SSR	x	x
Canada	x	x
Cyprus	—	x

120

Country or area	Pre-World Population Conference	Post-World Population Conference
Czechoslovakia	x	x
Denmark	x	x
Finland	x	x
France	x	x
German Democratic Republic	x	x
Germany, Federal Republic of	x	x
Greece	x	x
Hungary	x	x
Iceland	—	—
Ireland	x	—
Italy	x	x
Luxembourg	—	—
Malta	x	—
Netherlands	x	x
Norway	x	x
Poland	x	x
Portugal	x	—
Romania	x	x
Spain	x	—
Sweden	x	x
Switzerland	x	x
Turkey	x	—
Ukrainian SSR	x	—
USSR	x	x
United Kingdom	x	x
United States of America	x	x
Yugoslavia	x	x

Economic and Social Commission for Asia and the Pacific (ESCAP)

Country or area	Pre-World Population Conference	Post-World Population Conference
Afghanistan	—	x
Australia	x	x
Bangladesh	x	x
Bhutan	x	—
British Solomon Islands	—	—
Brunei	—	—
Burma	—	—
China	—	—
Cook Islands	—	—
Democratic Kampuchea	—	x
Fiji	x	—
France	x	x
Gilbert Islands and Tuvalu	—	—
Hong Kong	—	—
India	x	x
Indonesia	x	x
Iran	x	x
Japan	x	x
Lao People's Democratic Republic	—	—
Malaysia	x	x
Mongolia	—	—
Nauru	—	—
Nepal	x	x
Netherlands	x	x
New Zealand	x	x
Pacific Islands (Trust Territory)	—	—
Pakistan	x	x
Papua New Guinea	x	x
Philippines	x	x
Republic of Korea	x	x
Republic of South Viet-Nam	x	x
Singapore	x	x
Sri Lanka	—	—
Thailand	x	x
Tonga	—	—
USSR	—	x
United Kingdom	—	x
United States of America	x	x
Western Samoa	—	x

Observers

Country or area	Pre-World Population Conference	Post-World Population Conference
Canada	—	x
Romania	x	—
Sweden	—	x
Switzerland	x	—

Economic Commission for Latin America (ECLA)

Country or area	Pre-World Population Conference	Post-World Population Conference
Argentina	x	x
Barbados	x	x
Belize	x	—
Bolivia	x	x
Brazil	x	x
Canada	x	x
Chile	x	x
Colombia	x	x
Costa Rica	x	x
Cuba	x	x
Dominican Republic	x	x
Ecuador	x	x
El Salvador	x	x
France	x	x
Guatemala	x	x
Guyana	—	—
Haiti	—	x
Honduras	x	x
Jamaica	x	x
Mexico	x	x
Netherlands	x	x
Nicaragua	x	x
Panama	x	x
Paraguay	—	x
Peru	x	x
Trinidad and Tobago	—	—
United Kingdom	—	x
United States of America	x	x
Uruguay	—	x
Venezuela	x	x

Observers

Country or area	Pre-World Population Conference	Post-World Population Conference
Germany, Federal Republic of	x	—
Romania	x	—
Sweden	—	x
Switzerland	x	—

Economic Commission for Africa (ECA)

Country or area	Pre-World Population Conference	Post-World Population Conference
Algeria	—	x [a]
Benin	—	x
Botswana	—	x
Burundi	x	x
Central African Republic	—	—
Chad	—	—
Congo	x	—
Egypt	x	x
Equatorial Guinea	x	x
Ethiopia	x	x
France	—	x
Gabon	x	x
Gambia	x	—
Ghana	x	x
Guinea	—	x
Ivory Coast	—	—
Kenya	—	x
Lesotho	x	x
Liberia	x	x
Libyan Arab Republic	x	—
Madagascar	x	x
Malawi	—	—
Mali	x	—
Mauritania	—	x

Country or area	Pre-World Population Conference	Post-World Population Conference
Mauritius	—	—
Morocco	x	x
Niger	—	—
Nigeria	x	x
Rwanda	x	x
Senegal	x	x
Sierra Leone	—	—
Somalia	x	x
South Africa	—	—
Spain	—	—
Sudan	x	x
Swaziland	x	—
Togo	x	x
Tunisia	—	x
Uganda	—	x
United Kingdom	—	x
United Republic of Cameroon	—	x
United Republic of Tanzania	x	x
Upper Volta	x	—
Zaire	x	x
Zambia	x	x
Observers		
Canada	—	x
Sweden	—	x
United States of America	—	x

Economic Commission for Western Asia (ECWA)

Bahrain	x	x
Democratic Yemen	x	x
Iraq	x	x
Jordan	x	x
Kuwait	x	x
Lebanon	x	x
Oman	x	x
Qatar	x	x
Saudi Arabia	—	x
Syrian Arab Republic	x	x
United Arab Emirates	—	x
Yemen [b]	x	x
Observers		
Canada	—	x
Sweden	—	x

[a] Accepted invitation, but change in date of meeting prevented attendance.

[b] Attended at Doha, but not at Beirut.

Annex II

LIST OF DOCUMENTS SUBMITTED TO POST-WORLD POPULATION CONFERENCE REGIONAL CONSULTATIONS*

Economic Commission for Europe (ECE)

"Post-war demographic trends in Europe and the outlook until

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* In addition to the documents listed in this annex, copies of the World Population Plan of Action and other resolutions and recommendations to the World Population Conference were made available to each regional consultation in document CESI/WPY-22, as were copies of the reports of the regional consultations preparatory to the Conference (E/CONF.60/CBP/34).

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the year 2000" (ESA/P/AC.5/2), prepared by the ECE secretariat

J. Bourgeois-Pichat, "The economic and social implications of demographic trends in Europe up to and beyond the year 2000" (ESA/P/AC.5/3)

Dirk J. van de Kaa, "Population policies in Europe and North America" (ESA/P/AC.5/4).

Economic and Social Commission for Asia and the Pacific (ESCAP)

"Population change and development problems of the ESCAP region" (POP/POST-WPC/3), prepared by ESCAP

"Population strategy for development" (POP/POST-WPC/4), prepared by ESCAP

"A quick look at assistance for population programmes" (POP/POST-WPC/CR.2), prepared by ESCAP

Economic Commission for Latin America (ECLA)

Jorge Somoza, "America Latina: situación demográfica alrededor de 1973 y perspectivas para el año 2000" (ST/CEPAL/CONF.54/L.2)

"Population and development in Latin America: a summary diagnosis" (ST/ECLA/CONF.54/L.3) prepared by the ECLA secretariat

"Implications for Latin America of the World Action Plan" (ST/ECLA/CONF.54/L.4), prepared by Centro Latinoamericano de Demografía in co-operation with ECLA

Centro Latinoamericano de Demografía, "Perspectivas para la acción en población en America Latina: la contribución de los organismos regionales" (ST/CEPAL/CONF.54/L.5)

Economic Commission for Africa

"Proposals for a population programme of action for Africa following from the recommendations of the 1974 World Population Conference" (E/CN.14/POP/135), prepared by ECA

"Selected recommendations on population from ECA meetings" (E/CN.14/POP/116), prepared by ECA

"Integrated programmes on population" (E/CN.14/RES/273 (XII))

Economic Commission for Western Asia (ECWA)

"Priorities of the region and some suggestions in the population field within the framework of the World Population Plan of Action" (E/ECWA/POP/CONF.2/3), prepared by ECWA

"Recommendations of population meetings and conferences in the ECWA region" (E/ECWA/POP/CONF.2/4), prepared by ECWA

"Summary review of the population situation in the ECWA region" (E/ECWA/POP/CONF.2/5), prepared by ECWA

"The role of international assistance in the population field" (E/ECWA/POP/CONF.2/6).

"Substantive activities of ECWA in the population field" (E/ECWA/POP/CONF.2/7), prepared by ECWA

Annex III

RESOLUTION ADOPTED BY THE CONFERENCE OF (AFRICAN) MINISTERS DURING ITS THIRD MEETING IN FEBRUARY 1975

273(XII). *Integrated programmes on population*

The Conference of Ministers,

Recalling General Assembly resolution 2211 (XXI) of 17 December 1966 on population growth and economic development, in which the General Assembly recognized the sover-

eigfty of nations in formulating and promoting their own population policies with due regard to the principle that the size of the family should be the free choice of each individual family and called upon the regional economic commissions to assist, when requested, in further developing and strengthening national and regional facilities for training, research, information and advisory services in the field of population, bearing in mind the different character of population problems in each country and region and the needs arising therefrom,

Recalling also General Assembly resolution 2815 (XXVI) of 14 December 1971 on the United Nations Fund for Population Activities,

Bearing in mind the International Development Strategy for the Second United Nations Development Decade, contained in General Assembly resolution 2626 (XXV) of 24 October 1970, with particular reference to the demographic objectives and policy measures set forth in paragraphs 13 and 65 of the Strategy,

Recalling in that connexion Economic and Social Council resolution 1672 (LII) of 2 June 1972 on population and development, in which all Member States of the United Nations were urged to give full attention to their demographic objectives and measures during the biennial review and appraisal of the implementation of the Second United Nations Development Decade, and to take such steps as might be necessary to improve demographic statistics, research and planning machinery needed for development of population policies and programmes and to co-operate in achieving a substantial reduction of the rate of population growth in those countries which consider that their present rate of growth is too high and in exploring the possibility for the setting of targets for such a reduction in those countries.

Convinced that problems of fast population growth as well as the problem of under-population, among other things, could hamper rapid economic development in certain countries,

Recalling further that in its resolution 230 (X) of 13 February 1971, it requested the Executive Secretary to carry out a study of population levels and trends in relation to economic and social development and invited him to speed up the establishment of subregional centres for the training of demographers,

Taking note of the report of the second session of the Conference of African Demographers held in May 1974,

Noting with satisfaction the establishment and operation of the Regional Institute for Population Studies in Accra and the Institut de formation et de recherche démographiques in Yaoundé, the continuation of the Cairo Demographic Centre, and the studies undertaken by the secretariat of the Commission on population levels and trends in relation to economic and social development in specific country situations,

Further noting with satisfaction the growing awareness of population problems in Africa as evidenced by the desire of 21 countries of the region, 14 of whom had never carried out a population census, to undertake censuses within the framework of the African Census Programme in the near future,

Considering that the following targets should be accomplished within the next five years:

(a) Complete censuses in all African countries, to be followed by periodical sample surveys on fertility and mortality;

(b) Household sample surveys;

(c) The establishment of standardized systems of civil registration adapted to conditions in Africa;

(d) The establishment in all African countries of reliable, competent and well-equipped services on demographic statistics and analysis and the recruitment of staff for these services;

1. *Invites* the Executive Secretary to continue the studies on inter-relations of population growth and economic and social development, including a study to define population programmes within the context of other desirable and essential services in such fields as maternal and child health, community development, agricultural and rural extension services and urban development, and to study the demographic problems

of high fertility and sub-fecundity in those parts of Africa where they exist;

2. *Requests* the Executive Secretary to take up with the Secretary-General the question of strengthening the population infrastructure of the secretariat of the Commission with finances obtainable from the United Nations Fund for Population Activities and to take any other action required to implement fully the population programme of the Commission;

3. *Requests* the Governments of member States to give due attention to the socio-economic conditions of parents and children in Africa and to ensure that family planning becomes, subject to national sovereign rights and priorities, an integral part of development, particularly where maternal and child health services, community and rural extension activities and urban development are concerned;

4. *Urges* the Governments of member States to support the regional demographic training and research centres at Accra, Yaoundé and Cairo and to take full advantage of the training and research facilities available at them.

183rd meeting,
28 February 1975.

Annex IV

RESOLUTION ADOPTED BY THE UNITED NATIONS/ UNITED NATIONS FUND FOR POPULATION ACTIVITIES POST-WORLD POPULATION CONFERENCE CONSULTATION AMONG COUNTRIES OF THE ECE REGION, GENEVA, 7-11 JULY 1975

Implications of the World Population Plan of Action for the Economic Commission for Europe

The United Nations/United Nations Fund for Population Activities Post-World Population Conference Consultation among Countries of the ECE Region,

Mindful that the World Population Plan of Action has implications for the ECE member countries both in relation to their own development and for their role in providing assistance to the developing countries,

Recalling that the World Population Plan of Action calls upon the regional economic commissions to play an important role in its implementation,

Aware that the General Assembly, in its resolution 3344 (XXIX), calls upon the regional economic commissions, amongst other bodies, to determine how they can best assist in the implementation of the Plan of Action and on the adjustments which may be necessary in their work programmes and to report thereon to the Economic and Social Council,

Further aware that the Economic and Social Council, in its resolution 1946 (LVIII), called to the attention of the General Assembly the need to strengthen the monitoring, review and appraisal functions of the Secretariat arising from the recommendations of the World Population Conference and the World Population Plan of Action, and

Recognizing that the Economic and Social Council, in the same resolution, requested the Secretary-General to consult and make arrangements required with the interested specialized agencies and the regional economic commissions on the responsibilities and co-ordination activities involved in the monitoring, review and appraisal of the World Population Plan of Action,

Noting that the other regional commissions of the United Nations have already taken steps to assist in the implementation of the Plan of Action,

Bearing in mind the specific characteristics of the Economic Commission for Europe region,

Welcoming the growing attention paid by the Economic Commission for Europe to the interrelationships between social and economic development and demographic change,

123

1. *Requests* the Economic Commission for Europe to take, in co-operation with competent United Nations bodies, whatever measures are required to assist in the implementation of paragraph 7 of General Assembly resolution 3344 (XXIX) relating to the implementation of the World Population Plan of Action at the regional level;

2. *Further requests* the Executive Secretary of the Economic Commission for Europe to present to the Economic Commission for Europe at its thirty-first session proposals to secure the proper response to the demands laid upon the Economic Commission for Europe by the Plan of Action and General Assembly resolution 3344 (XXIX).