THE COMPARATIVE MIGRATION AND SETTLEMENT STUDY: A SUMMARY OF WORKSHOP PROCEEDINGS AND CONCLUSIONS

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Preface

Interest in human settlement systems and policies has been a critical part of urban-related work at IIASA since its inception. Recently this interest has given rise to a research effort focusing on the comparative study of the migration and settlement patterns and policies of a number of IIASA member countries. This paper, the fourth of a series dealing with that topic, summarizes the proceedings of a workshop which was held at Schloss Laxenburg to help launch the comparative study. Other papers of the migration and settlement study are listed on the back page of this report.

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Papers in the Comparative Migration and Settlement Study Series

1. Ross D. MacKinnon and Anna Maria Skarke, "Exploratory Analyses of the 1966-1971 Austrian Migration Table", RR-75-31, September, 1975.

2. Galina Kiseleva, "The Influence in Urbanization on the Birthrate and Mortality Rate for Major Cities in the U.S.S.R.," RR-76-68, forthcoming.

3. George Demko, "Soviet Population Policy," RM-75-74, forthcoming.

4. Andrei Rogers, "The Comparative Migration and Settlement Study: A Summary of Workshop Proceedings and Conclusions," RM-76-00, forthcoming.

Foreword

On December 12 and 13, 1975, a workshop entitled Migration and Settlement was held at Schloss Laxenburg to help launch an international comparative study of internal migration dynamics and human settlement patterns. The workshop was attended by participants from over a dozen countries and was instrumental in establishing a preliminary international network of collaborating scholars whose work will be assisted and coordinated by the International Institute for Applied Systems Analysis (IIASA).

The comparative study of migration and settlement is part of a larger research project currently underway at IIASA. This larger study addresses the same subject but also includes research subareas whose orientation is both narrower and more methodological. The other principal concerns of the larger study are:

(1) the further development of spatial mathematical demography;

(2) the definition and elaboration of a new research area called demometrics and its application to migration analysis and spatial population forecasting;

(3) an examination of the potential applicability of the optimal control paradigm for migration and settlement policy modelling; and

(4) the publication of a handbook on demographic models, computer programs, and data.

It is anticipated that the final results of this larger study ultimately will be collected together in a three-volume publication entitled:

Migration and Settlement: I. Dynamics, Metrics, and Policy

II. Case Studies

III. Models, Programs, and Data

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1.   Introduction

     In his annual report, IIASA '74, Howard Raiffa, the
Institute's first Director, listed three principal aspirations
that underlay the scientific progress hoped for when IIASA's
Charter was signed:

> "Aspiration 1: To work on problems of significance
> for mankind with scientists from different disci-
> plines, cultures, and ideologies.
>
> Aspiration 2: To establish a network of research
> institutions with coordinated research orientations.
>
> Aspiration 3: To raise the level of sophistication
> of technical analysts and policy makers concerned
> with major world problems; to bridge the gap between
> analyst and practitioner; to educate the specialist
> and interested non-specialist; to make the non-
> specialist aware of the dangers of fragmented
> thinking on complex global problems." (Raiffa, 1975,
> pp. ix-xii).

     During the first year of its existence in 1974, the Urban
and Regional Project, under the leadership of Harry Swain, set
out to identify and address several problems of significance in
the urban field. National settlement systems and strategies
was the first such problem and much of the urban project's work
in 1974 and 1975 revolved around this fundamental concern.

     The Urban and Regional Project's first year of work in
national settlement systems and strategies was capped in
December of 1974 by an international conference at which forty
outside participants and five IIASA scientists discussed
theoretical and management issues in the design of national urban

settlement strategies (Swain, 1975; Swain, Cordey-Hayes, and MacKinnon, 1975). Subsequently, the Project's scientific staff grew and, correspondingly, so did its research output on settlement systems (see Swain et al. 1975). By September of 1975 a firm foundation was laid and some progress was made with respect to each of the three aspirations listed by Raiffa. A problem of universal significance for mankind was addressed by an international team of scholars drawn from various member nations of IIASA. Preliminary contacts were established with scientific groups in several countries, and basic research on important aspects of settlement processes and problems had been initiated.

In September of 1975 leadership of the Urban and Regional Project passed to Niles Hansen and work on human settlement systems at IIASA entered its second phase. This next stage of research seeks to further expand our knowledge about spatial settlement systems by focusing on three related areas of inquiry: the dynamics of spatial demographic change, econometric analysis and forecasting of such change (demometrics) and policies for guiding this change in desirable directions. A central unifying thread running throughout all three areas is migration.

2. Migration and Settlement

2.1 Introduction

Human settlement issues and problems recently have become the focus of increasing concern among national governments in many West and East European countries, in North America, and in parts of the Third World. Programs to encourage the development of economically declining areas, to stem the growth of large urban centers, and to revitalize the central parts of expanding metropolises have become parts of national agendas all over the globe. A notable manifestation of such concern may be found in the work of the U.S. Commission on Population Growth and the American Future, which devoted one of its eight

Research Reports (Volume V) entirely to the subject of population distribution policy.

Although much of the U.S. Commission's attention was directed at national population growth and its consequences, for its research report, Population, Distribution, and Policy, it commissioned papers that directly addressed issues and problems of human settlement and internal migration:

> "Major national attention and the Commission's primary focus has been on national population growth. But national growth implies local growth as additional population is distributed in the rural areas, small towns, cities and suburbs across the country. And choices we make about national population growth cannot help but have important meaning for local areas ...
>
> The United States is a mobile society. Migration has been an important avenue of personal improvement. Where people move inevitably affects the distribution of the population and the growth of local areas. As a result, any national distribution policy will, to some degree, try to intervene in the migration process by encouraging people to move to one place rather than another or not to move at all." (U.S. Commission on Population Growth and the American Future, 1972, pp. xiv-xv, italics added.)

The recognition that a national settlement policy will require a migration policy also appears in a publication of the Urban Affairs Division of Canada's Ministry of State:

> "Underlying all the previous major classes of issues -- i.e., 'growth-guidance' relating to 'metropolitanization,' differential growth within and around metropolitan areas, environmental quality and declining or lagging regions -- are the demographic mechanisms embodied in redistribution processes. These mechanisms particularly involve internal migration, external migration, and fertility ... migration ... is more of a target of policy initiatives than is fertility. Government actions aimed at guiding or facilitating both types of migration (internal and external) form a major aspect of distribution policy." (Stone and Stiggner, 1974, p. 16, italics added.)

Finally, a similar view is echoed by H. ter Heide in his review of the general characteristics of population redistribution policies in West European countries:*

"... these policies show certain common characteristics...:

1. The programmes are concerned with internal migration rather than with regional differences in the rate of natural increase.

2. With few exceptions, the programmes are not directed toward actually redistributing the present population. Their aim is rather to influence trends of internal migration with a view to changing the rates of population development of the various regions." (ter Heide, 1971, p.2996).

Despite the general recognition that migration processes and settlement patterns are intimately related, one nevertheless finds that the dynamics of their interrelationships are not well understood. An important reason for this lack of understanding is that demographers have in the past accorded migration a status subservient to fertility and mortality and have almost totally ignored the spatial dimension of population growth.** Thus, whereas problems of fertility and mortality long ago stimulated a rich and scholarly literature, studies of migration have only recently begun to flourish. In consequence, one finds today a rather large and growing body of scholarly work on migration awaiting a systematic synthesis (e.g., the recent bibliographies of Greenwood, 1975; Price and Sikes, 1975; and Shaw, 1975). The contributions of sociologists in identifying migration differentials (the "who" of migration), of geographers in analyzing directional migration streams (the "where" of migration), and of economists in examining the determinants and consequences of internal migration (the "why" and "so what" of migration) still have not been systematically synthesized into

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* Two other common characteristics are listed by ter Heide: decentralization of population between regions (i.e., a levelling-off of densities regionally), decongestion of population in urban centers and a concomitant uplifting of the economic level of declining areas.

** There are, of course, a few notable exceptions, e.g., the work of Peter Morrison in the U.S.A. and that of Leroy Stone in Canada.

a unified general theory of internal migration.

Out of the recently burgeoning literature on migration, we at IIASA have identified and isolated three related research subareas that are of particular relevance to our long-term general interests in national settlement systems and strategies. They are:

1. Spatial Population Dynamics
   The mathematics of spatial demography; the interaction of age compositions and spatial distributions; regularities in fertility, mortality, and migration schedules; sensitivity analysis; spatial zero population growth; aggregation and decomposition in demographic analysis.

2. Migration Analysis and Spatial Population Forecasting
   The econometrics of internal migration; the "push-pull" hypothesis re-examined; chronic movers and return migration; migration as investment; occupational mobility and internal migration; consistent econometric forecasting of regional growth; demometrics.

3. Spatial Settlement Policy
   Spatial population redistribution trends and problems; spatial city-size hierarchies, metropolitan deconcentration, and urban fields; migration as a mechanism for spatially allocating an economy's labor force; the spatial externalities of internal migration; migration and settlement policy; the optimal control paradigm.

During the next two years the Urban Project will be concentrating a significant proportion of its intellectual and financial resources toward the further scholarly development of the three research subareas listed above. We shall also strive to apply the models, theories, and computer programs developed in the course of this effort to data from as wide a representation

of IIASA's national member countries as possible. (Selected
non-member countries with unusually rich data bases also will
be represented.) This particular activity will serve as the
central focus of our comparative study of migration and
settlement.

2.2 The Comparative Study

In order to better delineate the general form of the
comparative study, it will be useful to adopt as a paradigm
a completed study that already has been carried out in a closely
related area. Specifically, before outlining our plans for a
comparative study of human migration and redistribution we shall
first describe an analogous study of human mortality-fertility
and reproduction, namely, the study of Keyfitz and Flieger (1971)
entitled Population: Facts and Methods of Demography.

The Keyfitz and Flieger study focuses on age- and sex-
specific mortality and fertility schedules and projects the
evolution of the populations exposed to these schedules. The
principal concern throughout is growth:

> "To think of population today is to think of growth...
>
> Formal demography helps to describe and analyze
> population growth. It applies mathematical models to
> the processes of birth and death, recognizing divisions
> of population by age and sex. This book includes
> accounts of the models most commonly used, the computer
> programs by which these models are implemented, and
> instances of the use of these models to draw conclusions
> about the population trends of the present day." (Keyfitz
> and Flieger, 1971, p. vii).

In order to examine the population trends of the present day,
Keyfitz and Flieger collect together population statistics from
more than 90 countries and subject them to a standardized ana-
lytical process:

> "Most national official data bearing on rates of
> birth and death in the late 1960's are represented
> here. Every country that has usable vital statistics

is shown for at least one year...

      All data that we were given are shown as Table 1
of the Main Tables of this volume -- population and
deaths by age and sex, and births by age of parent.
Everything else, that is to say the remaining seven
tables for each country, city, or other area, was
computed by us. Before computers were available no
one made such calculations centrally, and life tables
and population projections were customarily produced
in national statistical offices, or else not calculated
at all. The computer enables us to go from simple
distributions by age and sex to the implied probabili-
ties of living and dying. These and numerous other
quantities are calculated by uniform methods..."
(Keyfitz and Flieger, 1971, pp. vii-viii.)

If national population growth is the primary <u>focus</u> of the
Keyfitz and Flieger study, its principal <u>approach</u> for examining
such growth is embodied in a collection of computer programs
which provide the vehicle for analyzing population growth in
a consistent and uniform manner. These programs and the
mathematical models that underlie them are presented in the
study volume:

      "A major feature of this book is the inclusion
of computer programs, which are expressed in as
universal a FORTRAN IV as we could manage...

      The twelve separate programs listed in Part III
produce life table, projections, intrinsic rates, and
other quantities needed in formal demography...

      Demographic theory is also provided in Part III,
beginning with the life tables, and continuing through
population projection, analysis of a population pro-
jection in its matrix form, the Lotka equation and its
solution, standardization, and other matters." (Keyfitz
and Flieger, 1971, p. ix.)

Finally, the major <u>contribution</u> of the Keyfitz and Flieger
study is the uniform application of a consistent methodology to
a vast amount of data in order to trace population growth
trends in a large number of countries:

"Our contribution is the linking of data and
theory. Theory helps to interpret the data, to
bring out their bearing on current population
issues. It helps equally to check the data by
seeing how well their elements of population,
births, and deaths as fitted into models are con-
sistent with one another. The interpretation as
well as the checking are aided by the computer,
and we not only give our own computed results, but
also make available a collection of programs."
(Keyfitz and Flieger, 1971, p. ix.)

The focus, approach, and contribution of the Keyfitz and
Flieger study have much in common with those of the comparative
migration and settlement study. The focus of the latter also is
population growth, but _spatial_ population growth. The approach
also relies on a uniform set of computer programs, but these
embody the models of _multiregional_ mathematical demography
(Rogers, 1975). And the expected contribution also is that of
linking data and theory, but the data and theory to be linked
are _spatial_ in character.

There are several important differences between the two
study formats, however.

1. A primary concern of the Keyfitz and Flieger study is
   population _reproduction_ and the _demographic transition_
   from high to low birth and death rates. An important
   focus of the comparative migration and settlement study
   is population _redistribution_ and the _mobility transition_
   (Zelinsky, 1971) from low to high migration rates.

2. The Keyfitz and Flieger study is the product of two
   authors; the comparative migration and settlement study
   will require the efforts of an international team of
   scholars residing in various member and non-member
   nations.

3. The Keyfitz and Flieger study identifies trends and the
   numerical consequences of the continuation of such trends

into the future; the comparative migration and settle-
ment study will, in addition, strive to link national
trends with explanatory variables.

4. Although Chapter 4 of their book is entitled "Policy
    Dilemmas and the Future," the Keyfitz and Flieger study
    does not deal with national policies. (Their Chapter 4
    is only three pages long.) The comparative migration
    and settlement study, however, will explicitly consider
    the national migration and settlement policies of each
    country represented.

5. The number of countries included in the comparative
    migration and settlement study will for obvious reasons
    be only a small fraction of those included in the Keyfitz
    and Flieger study.

The comparative migration and settlement study is concerned
with national patterns of internal population movement and the
redistributive impacts of such movement on the national spatial
hierarchy of urban regions. Because of data limitations it is
likely that much of the redistributive consequences will have to
be examined with reference to areal units that are considerably
larger than individual urban centers, e.g., regions such as
states. However, every effort will be made to ultimately focus
the analysis on "functional urban regions" whenever this is
empirically possible and computationally feasible.

The comparative study will be carried out by an international
team of scholars, but like the Keyfitz and Flieger study it will
be founded on results produced by a common set of computer programs,
which will be published along with the data used by them.

Finally, in instances where national data for the comparative
study are inadequate or incomplete, recourse to "model" schedules
will be made using procedures such as those set out in the United
Nations Manual Methods of Estimating Basic Demographic Measures
from Incomplete Data (Coale and Demeny, 1967).

3. Workshop Presentations

Six semi-formal presentations formed an important part of the workshop on migration and settlement. The first three dealt with modelling and were scheduled on the first day of the two-day workshop; the last three dealt largely with policy and took place on the second day. The detailed agenda of the workshop appears in Appendix A. We present here only the abstracts of the six presentations. More detailed summaries may be obtained from the respective participants.

3.1 Spatial Population Dynamics (A. Rogers)

The evolution of every spatial human population is governed by the interactions of births, deaths, and migration. Individuals are born into a population, age with the passage of time, reproduce, and ultimately leave the population because of death or outmigration. These events and flows enter into an accounting relationship in which the growth of a regional population is determined by the combined effects of natural increase (births minus deaths) and net migration (in-migrants minus outmigrants). This presentation focused on such relationships and identified and clarified some of the more fundamental spatial population dynamics that are involved. Particular attention was paid to the use of aggregation and decomposition procedures in projecting the spatial dynamics of large-scale population systems.

References: A. Rogers and F. Willekens (1975) "Spatial Population Dynamics," IIASA RR-75-24, and A. Rogers (1976) "Aggregation and Decomposition in Population Projection," IIASA RM-76-00.

3.2 Spatial Demographic Accounts (P.H. Rees)

The average American moves about 14 times in his lifetime, the average Briton about 8 times, the average

Japanese about 5 times. Mobility appears to be on the
increase in a great many countries and Zelinsky (1971)
has argued that a transition from low to high mobility
parallels that of the conventional demographic transition.
However, population analysts are only now beginning to
catch up with these facts in their measurement of life
expectancies, and their modelling of the future path of
population change. This presentation reviewed the nature
of the analytical tools called spatial demographic accounts
and illustrated how they can be used to investigate the way
population changes in a multiregional system.

Reference: P.H. Rees and A.G. Wilson (1975) "A Comparison
     of Available Models of Population Change," Regional
     Studies, Vol. 9, pp. 39-61.

3.3   Computer Programs for Spatial Demographic Analysis
     (F. Willekens)

A central element of the comparative study of migration
and settlement will be a collection of "canned" computer
programs for spatial demographic analysis. Three of the
programs developed so far were described in this presen-
tation. These programs produce, respectively, a components-
of-change projection of a spatial population, a multiregional
life table, and a cohort-survival projection of a multiregional
population disaggregated by age. Sample outputs using data on
the U.S.S.R. and the U.S.A. appear in Appendix C.

Reference: N. Keyfitz and W. Flieger (1971) Population:
     Facts and Methods of Demography (San Fransisco: W.H.
     Freeman).

3.4   Migration Policy   (P. Drewe)

In the world of classical static economic theory, no need
for a migration policy exists since perfect mobility of factors
of production is assumed. In a dynamic economic theory,

however, no such optimal equilibrium situation would necessarily develop and various time lags can combine to produce suboptimal conditions, such as pockets of unemployment, which call for intervention. "It is the object of the mobility and migration policy of governments, a. to raise the mobility of labour and capital in general, and b. to provide incentives for people and industries that intend to move....in so far as this move accords with the governments' regional targets." (Klaassen and Drewe, 1973, p. 1.)

This presentation reviewed some of the findings of the Klaassen and Drewe comparative study of migration policy in Europe and reflected on some of the problems inherent in such studies. More recent developments in the Netherlands also were briefly reviewed.

References: L.H. Klaassen and P. Drewe (1973) Migration Policy in Europe: A Comparative Study (England: Saxon House, D.C. Heath Ltd.), and P. Drewe (1971) "Steps Toward Action-Oriented Migration Research," Papers, Regional Science Association, Vol. 26, pp. 145-165.

3.5 Case Study: I. Migration and Settlement in Austria (A.M. Skarke and M. Sauberer)

The presentation by Skarke summarized the principal results generated by the application of four different techniques to analyze recent interregional migration flows in Austria. Insights into the tendencies and processes of this internal migration and their implications for the future spatial pattern of human settlements in the country were discussed.

The second presentation, by M. Sauberer, described the methodology and major findings of recent projections made by the Austrian Institute for Regional Planning. Unlike the Skarke-MacKinnon projections, these include a disaggregation by age but treat migration as a net flow.

References: R.D. MacKinnon and A.M. Skarke (1975) "Exploratory
     Analysis of the 1966-1971 Austrian Migration Table," IIASA
     RR-75-31, and M. Sauberer (1975) Extrapolation der Bevöl-
     kerungsentwicklung bis zum Jahr 1991 in den Stadt- und
     Wohnungsmarktregionen (Wien: Österreichisches Institut für
     Raumplanung).

3.6 Case Study: II. Migration and Settlement in the U.S.A.
     (L.H. Long)

The focus of this presentation was the recently changing
pattern of internal migration in the U.S.A., particularly with
respect to the South. "The South's changeover from net out-
migration to net in-migration began in the late 1950's. In the
1960's the South experienced substantial in-migration, which
increased in the 1970's to make the South the nation's fastest
growing region...." (Long and Hansen, 1975, p. 601).

The presentation identified trends in return migration to
the South and discussed the importance of such migration in
relation to other types of in-migration and out-migration.

Reference: L.H. Long and K.A. Hansen (1975) "Trends in
     Return Migration to the South," Demography, Vol. 12,
     pp. 601-614.

4.   Workshop Deliberations and Conclusions

Two discussion sessions were scheduled in the workshop's
formal agenda, each one following a day of semi-formal presen-
tations. Additional free time for discussion was available
during the various coffee and luncheon breaks. No attempt will
be made here to capture the richness of the debate; only a few
major points will be recorded for future reference.

The consensus among the participants at the workshop was
one of general approval of the principal outlines of the compara-
tive study, but a few reservations were raised regarding potential

data and definitional problems in particular.

Published data on internal migration varies enormously among nations. In some countries, generally those with population registers, migration data are readily available at various levels of resolution, both in terms of spatial detail and with regard to the attributes of the migrants. Typical of such "data rich" countries are Norway, Sweden, and Denmark. In other countries, such as the United States and the United Kingdom, migration data are much more scarce and are obtained largely from decennial or quinquennial censuses. Nevertheless, at least some migration data are available in age- and sex-specific detail with respect to place-to-place flows. Yet another situation exists in other countries such as the U.S.S.R., Yugoslavia, and Poland. Here, migration data are in principle available in detailed disaggregated form, but they are not published in such form and the costs of so assembling them from the raw materials is clearly beyond the means of the comparative study.

To meet this data problem the comparative study will resort to the use of "model" age-specific schedules whenever necessary. Model mortality and fertility schedules have been used with considerable success to develop population estimates and projections in developing countries lacking reliable vital registration systems, and the conventional methodology is carefully outlined in the United Nations manual Methods of Estimating Basic Demographic Measures from Incomplete Data. The principal feature of the procedures outlined there is the exploitation of the regularities exhibited by available data, collected in countries with accurate vital registration systems, to systematically approximate mortality and fertility schedules in regions lacking such data. An analogous approach appears to be feasible with regard to migration schedules.

"Demographers have long recognized the persisting
regularities that prevail among age-specific outmigra-
tion schedules, the most prominent being the high con-
centration of migration among young adults... Rates of
migration are also high among children, varying from a
high during the first year of life to a low at about
age 16. From that point, the age profile turns sharply
upward to a peak in the neighborhood of 22 years,
declining regularly with age except for a slight hump
around ages 62 through 65." (Rogers, 1975, p. 146.)

Figure 1, provided by Arvidsson (and Snickars) of Sweden
and Figure 2, drawn on the basis of data provided by Kiseleva
of the U.S.S.R. suggest that the regularities in the age
profiles of U.S. migrants are likely also to prevail in most
European countries.

Definitional problems regarding what constitutes migration
and what regional boundaries are appropriate for a comparative
study of migration were repeatedly raised in the presentations and
discussions of the workshop. The common denominator would appear
to be a change of residence. Yet much of such geographical
mobility is not migration in the commonly accepted interpretation
of the term. Movement from one labor market to another would
seem to be an appropriate definition of migration. But such
disaggregated data are rarely available, and, when available,
entail large computational costs to analyze. It is likely that
this definitional problem ultimately will be resolved in the
context of constraints set by a combination of data availability
and computational feasibility.

A useful suggestion made by Dziewonski of Poland was the
possibility of adopting a hierarchical approach to the spatial
definition problem alluded to above. Specifically, it may be
appropriate to adopt a multi-tiered spatial resolution.
Detailed information about internal migration patterns would be
presented at a macro spatial system level, coarser levels of
detail would be provided at a mezzo spatial system level, and
only aggregate measures would be computed at the micro spatial
system level. The implications of such hierarchical decompositions
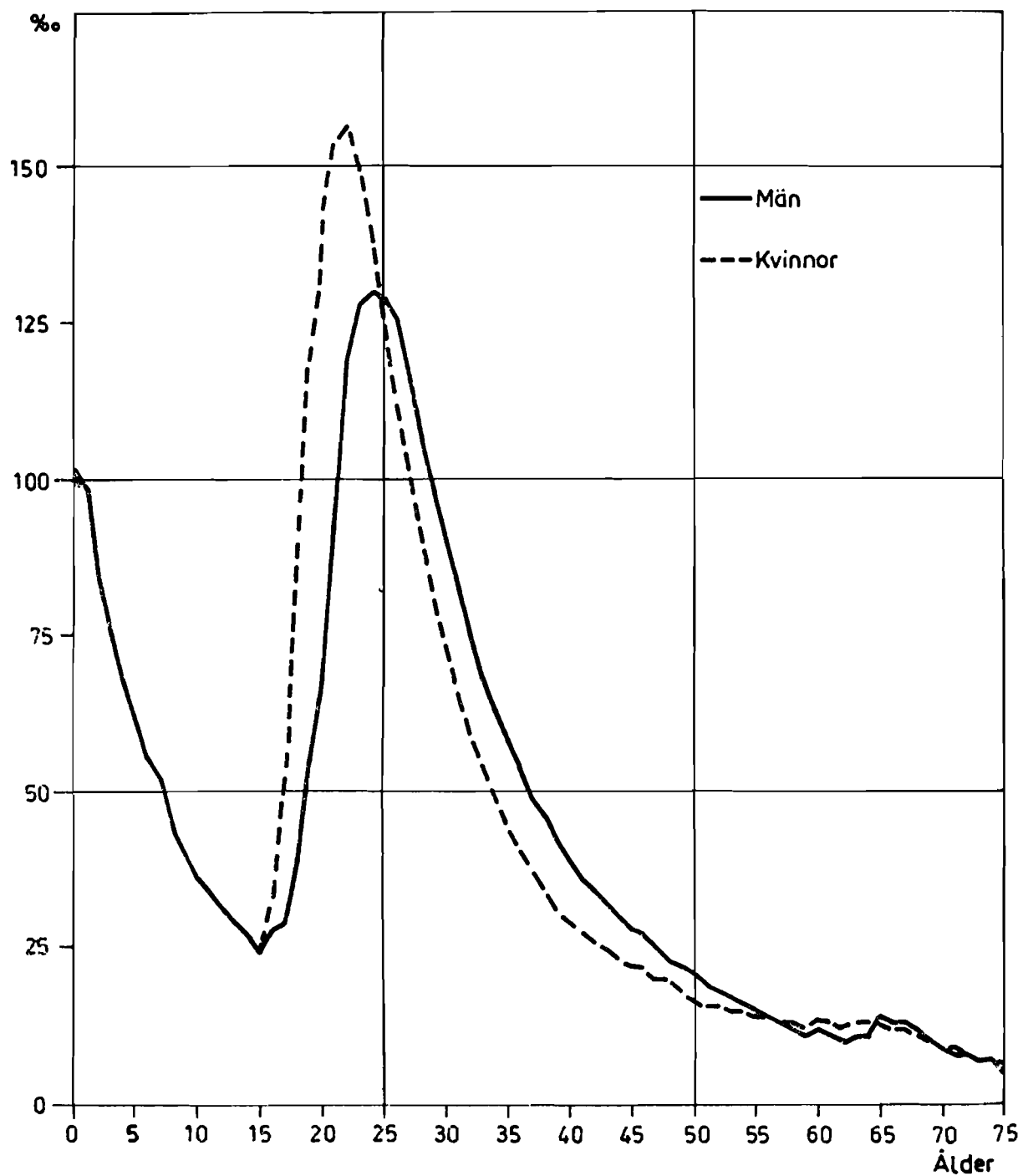
Figure 1. Age Profile of Migration: Sweden.

6. Состав прибывших в городские поселения и выбывших из них по возрастным группам

(в процентах к итогу)

	Прибыло IN	Выбыло OUT	Механический прирост
Всего населения	100,0	100,0	100,0
в том числе в возрасте:			
0—15 лет	11,0	9,0	19,2
16—19 »	21,4	24,2	10,3
20—24 »	31,2	28,0	44,5
25—29 »	9,0	10,1	4,2
30—34 »	9,7	10,6	6,0
35—39 »	4,7	5,0	3,1
40—44 »	4,2	4,3	3,7
45—49 »	2,1	2,1	2,2
50—54 »	1,2	1,2	1,1
55—59 »	1,5	1,4	1,6
60 лет и старше	3,8	3,8	4,2
возраст не указан	0,2	0,3	0,1
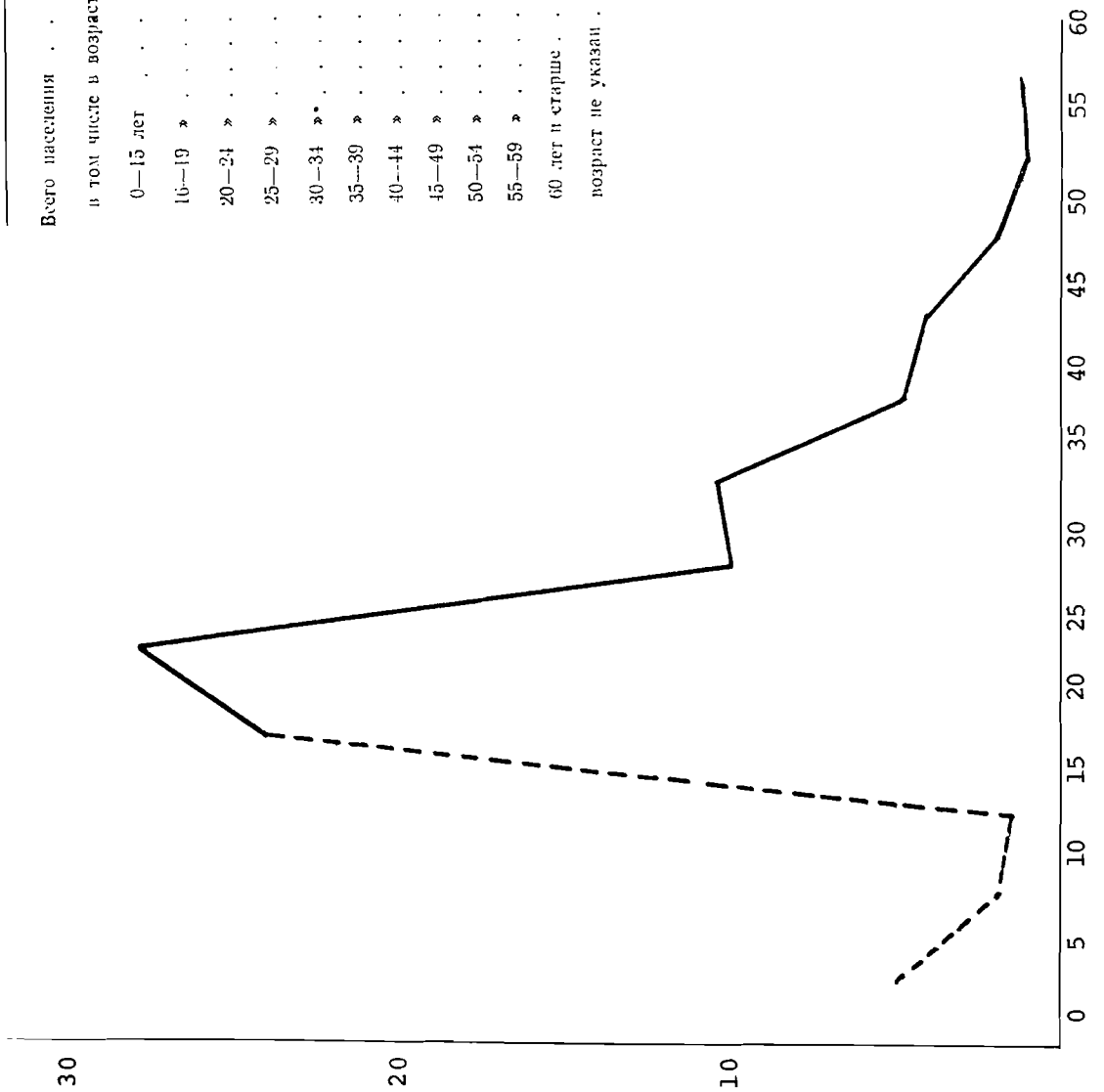
Figure 2. Age Profile of Migration: U.S.S.R.

need to be examined carefully.

Several workshop participants recommended an "accordion" approach to presenting data, indicators, and projections for each country included in the comparative study. Specifically, the suggestion made was that countries with "rich" migration data bases such as Sweden receive more analytical attention than "data poor" countries. There seemed to be a consensus that the study outputs should not be restricted by the weakest link in the data chain.

Finally, it was generally agreed that an effort should be made to include additional countries not represented by parti- cipants at the workshop. Useful suggestions regarding possible contacts were made with respect to the German Democratic Republic, the Federal Republic of Germany, Finland, Czechoslovakia, and Switzerland. An appeal was made by the conference chairman for a list of additional potential contacts in other unrepresented national member countries of IIASA.

The workshop concluded with an agreement that the contacts and exchanges established by the workshop would be strengthened and expanded during 1976.

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RELATED PAPERS OF THE MIGRATION AND

SETTLEMENT STUDY

Papers in the Spatial Population Dynamics Series

1. Andrei Rogers and Frans Willekens, "Spatial Population
     Dynamics," RR-75-24, July, 1975, forthcoming in
     Papers, Regional Science Association, Vol. 36, 1976.

2. Andrei Rogers and Jacques Ledent, "Multiregional Popula-
     tion Projection," internal working paper, forthcoming
     in Proceedings, 7th I.F.I.P. Conference, 1976.

3. Andrei Rogers and Jacques Ledent, "Increment-Decrement Life
     Tables: A Comment," internal working paper, forth-
     coming in Demography, 1976.

4. Andrei Rogers, "Spatial Migration Expectancies," RM-75-57,
     November 1975.

5. Andrei Rogers, "Aggregation and Decomposition in Population
     Projection," RM-76-00, January 1976.

Papers in the Migration and Settlement Policy Analysis Series

1. Yuri Evtushenko and Ross D. MacKinnon, "Non-Linear
     Programming Approaches to National Settlement System
     Planning," RR-75-26, July, 1975.

2. R.K. Mehra, "An Optimal Control Approach to National
     Settlement System Planning," RM-75-58, November,
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APPENDIX   A

Workshop Agenda

International Institute for Applied Systems Analysis
Schloss Laxenburg, Austria

IIASA
2361 Laxenburg
Austria
Tel. 02236-7485
Telex 07/9137

WORKSHOP ON MIGRATION AND SETTLEMENT
DECEMBER 12-13, 1975
AGENDA

FRIDAY, 12 DECEMBER, 1975

9:00 - 9:15 - INTRODUCTION AND WELCOME (HANSEN)
9:15 - 10:15 - SPATIAL POPULATION DYNAMICS (ROGERS)
10:15 - 10:30 - COFFEE BREAK
10:30 - 11:30 - SPATIAL DEMOGRAPHIC ACCOUNTS (REES)

11:30 - 13:15 - L U N C H AND TOUR OF SCHLOSS LAXENBURG

13:15 - 13:30 - INTRODUCTION (ROGERS)
13:30 - 14:30 - COMPUTER PROGRAMS, DATA INPUTS AND OUTPUTS
(WILLEKENS, ROGERS)
14:30 - 14:45 - COFFEE BREAK
14:45 - 16:00 - DATA AVAILABILITY (ARVIDSSON, BAUČIĆ, KORCELLI
AND OTHERS)
16:00 - 19:00 - F R E E (INFORMAL UNSCHEDULED DISCUSSIONS)

19:00 - 22:00 - D I N N E R AT A HEURIGER (GUMPOLDSKIRCHEN)

- - - - - - - - -

SATURDAY, 13 DECEMBER, 1975

9:00 - 9:15 - INTRODUCTION (ROGERS)
9:15 - 10:15 - MIGRATION POLICY (DREWE)
10:15 - 10:45 - COMMENTS (HANSEN)
10:45 - 11:00 - COFFEE BREAK
11:00 - 12:00 - CASE STUDY #1: AUSTRIA (SAUBERER, SKARKE)

12:00 - 13:30 - L U N C H

13:30 - 14:30 - CASE STUDY #2: USA (HANSEN, LONG, ROGERS)
14:30 - 14:45 - COFFEE BREAK
14:45 - 17:00 - RESPONSE AND DISCUSSION (PARTICIPANTS)

APPENDIX B

List of Invited Participants

WORKSHOP ON MIGRATION AND SETTLEMENT

International Institute for Applied
Systems Analysis
Schloss Laxenburg, Austria

December 12-13, 1975

INVITED PARTICIPANTS

AUSTRIA: Dr. Michael SAUBERER,
                Osterreichisches Institut für
                 Raumplannung,
                Franz Josefs-Kai 27,
                1011 Vienna.

                Ms. Anna-Maria SKARKE,
                Interdisziplinäres Institut
                 für Raumordnung,
                Hochschule für Welthandel,
                Hasenauerstrasse 42/8,
                A-1190 Vienna.

BELGIUM: Mr. Frans WILLEKENS,
                IIASA Scholar,
                (Laxenburg).

CANADA: Dr. John MIRON,
                IIASA Scholar,
                (Laxenburg).

DENMARK: Mr. Soren Hostrup PEDERSEN,
                Danmarks Statistik,
                Box 2500, DK-2100,
                Copenhagen.

FRANCE: Mr. Richard RAQUILLET,
                3, Place des Pressoirs,
                Bucherlay,
                78200 Mantes la Jolie.

HUNGARY: Dr. Ferenc RABAR,
                IIASA Scholar,
                (Laxenburg).

NETHERLANDS: Prof. Paul DREWE,
                University of Technology,
                Berlageweg No.1, Room 1207,
                Bouwkunde Department,
                Delft.

NORWAY: Mr. Lars ØSTBY,
                Central Bureau of Statistics (on leave)
                Geografisk Institutt,
                Universitetet i Oslo,
                Blindern, Oslo.

POLAND: Prof. Kazimierz DZIEWONSKI,
                        Institute of Geography,
                        Polish Academy of Sciences,
                        Krakowskie Przedmiescie 30,
                        00-927 Warsaw.

                        Dr. Piotr KORCELLI,
                        IIASA Scholar,
                        (Laxenburg).

SWEDEN: Mr. Arne ARVIDSSON,
                        Swedish National Central
                         Bureau of Statistics,
                        Fack, S-102 50 Stockholm.

UNITED KINGDOM: Dr. Philip REES,
                        University of Leeds,
                        Department of Geography,
                        Leeds LS2 9JT.

U. S. A.:   Dr. Larry LONG,
                        U.S. Bureau of the Census,
                        Washington, D.C.

                        Prof. Andrei ROGERS,
                        Chairman of the Workshop,
                        IIASA Scholar,
                        (Laxenburg).

U. S. S. R.:   Dr. Galina KISELEVA,
                        IIASA Scholar,
                        (Laxenburg).

YUGOSLAVIA   Prof. Ivo BAUCIC,
                        University of Zagreb,
                        Center for Migration Studies,
                        Zagreb.

APPENDIX   C

Sample Computer Outputs

1.   Components-of-Change Model (U.S.S.R.)

2.   Multiregional Life Table (U.S.A.)

3.   Multiregional Population Projection (U.S.A.)

Appendix C-1

Components-of-Change Model (U.S.S.R.)

COMPONENT OF CHANGE MODEL   1969
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*****        COMPONENT OF CHANGE MODEL
*****                USSR 1969
*****        TOTAL MIGRATION BETWEEN REPUBLICS
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OBSERVED POPULATION CHARACTERISTICS
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***********************************************
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REGION	POPULATION	BIRTHS	DEATHS	INTERNAL MIGRATION			EXTERNAL MIGRATION			POPULATION
				OUTMIG.	INMIG.	NET MIG.	OUTMIG.	INMIG.	NET MIG.	
REP.1	129419281.	1847125.	1185673.	584083.	502561.	-81523.	0.	0.	0.	130079208.
REP.2	46854172.	692760.	405288.	291604.	276477.	-15127.	0.	0.	0.	47126516.
REP.3	89266285.	1431137.	66617.	67240.	66773.	-467.	0.	0.	0.	90022338.
REP.4	11442781.	385841.	70797.	60115.	101719.	41604.	0.	0.	0.	11799429.
REP.5	127774993.	303103.	80654.	210954.	222237.	11284.	0.	0.	0.	130008726.
REP.6	4615503.	87635.	35148.	10515.	28883.	18368.	0.	0.	0.	4686358.
REP.7	4988507.	149930.	35820.	13309.	27773.	14464.	0.	0.	0.	5117081.
REP.8	3102228.	54431.	27216.	13774.	12566.	-1208.	0.	0.	0.	3128236.
REP.9	3522415.	67809.	26410.	24935.	29994.	5059.	0.	0.	0.	3568873.
REP.10	2364214.	33098.	26242.	22467.	15524.	-6943.	0.	0.	0.	2364127.
REP.11	2859072.	88277.	21996.	36133.	43585.	7452.	0.	0.	0.	2932805.
REP.12	2807366.	100616.	17688.	18430.	27737.	9307.	0.	0.	0.	2899602.
REP.13	2448008.	56815.	12958.	10338.	10346.	8.	0.	0.	0.	2491873.
REP.14	2094268.	74050.	14896.	15444.	20902.	5459.	0.	0.	0.	2158880.
REP.15	1358119.	21019.	15324.	17580.	9844.	-7736.	0.	0.	0.	1356079.
TOTAL	239577216.	4105647.	1962725.	1396917.	1396917.	0.	0.	0.	0.	241720128.

MIGRATION FLOW MATRIX
****

FROM COLUMN TO ROW

	REP.1	REP.2	REP.3	REP.4	REP.5	REP.6	REP.7	REP.8	REP.9	REP.10	REP.11	REP.12	REP.13	REP.14	REP.15
REP.1	0.	209830.	39746.	321209.	1311100.	5731.	6668.	7089.	11564.	11194.	18132.	9166.	2554.	7111.	10571.
REP.2	2133865.	0.	11850.	3518.	238850.	1734.	1179.	1805.	9127.	3134.	1025.	933.	6639.	1617.	2204.
REP.3	425503.	11130.	0.	585.	4770.	352.	277.	1957.	498.	3344.	158.	191.	76.	233.	702.
REP.4	54169.	92210.	1339.	0.	0.	278.	362.	146.	340.	307.	45500.	4942.	270.	3107.	585.
REP.5	1491183.	328856.	9350.	9963.	0.	549.	699.	791.	2319.	1228.	10632.	1756.	299.	1356.	1261.
REP.6	16887.	4178.	335.	486.	1722.	0.	1472.	83.	157.	179.	125.	68.	2950.	1113.	130.
REP.7	15849.	3328.	509.	644.	2245.	775.	0.	62.	166.	184.	50.	103.	3247.	501.	112.
REP.8	7696.	1131.	923.	138.	661.	36.	37.	0.	62.	1619.	36.	30.	0.	20.	173.
REP.9	15018.	9045.	431.	142.	3812.	232.	90.	190.	0.	464.	88.	51.	71.	318.	106.
REP.10	9590.	1737.	1264.	165.	525.	66.	78.	1284.	108.	0.	50.	26.	28.	35.	569.
REP.11	211804.	2597.	310.	4700.	12104.	46.	172.	40.	86.	141.	0.	749.	22.	393.	423.
REP.12	148800.	2353.	273.	678.	3006.	40.	57.	44.	245.	91.	588.	0.	46.	520.	698.
REP.13	5162.	1011.	132.	356.	717.	537.	2003.	18.	48.	46.	90.	79.	0.	116.	32.
REP.14	108594.	1816.	428.	2554.	3954.	114.	179.	38.	154.	73.	325.	287.	108.	0.	16.
REP.15	6702.	1383.	354.	80.	323.	29.	41.	229.	64.	526.	36.	50.	22.	6.	0.

GROWTH MATRIX
****

	REP.1	REP.2	REP.3	REP.4	REP.5	REP.6	REP.7	REP.8	REP.9	REP.10
REP.1	1.000122	0.004448	0.004405	0.002281	0.01026	0.00124	0.00134	0.00228	0.00328	0.00473
REP.2	0.001165	0.99991	0.001133	0.000031	0.001187	0.000038	0.000024	0.000058	0.00259	0.00133
REP.3	0.000033	0.000024	1.000104	0.000005	0.000337	0.000008	0.000006	0.000063	0.000014	0.000141
REP.4	0.000042	0.000020	0.000015	1.022228	0.000174	0.000006	0.000007	0.000005	0.000012	0.000013
REP.5	0.000115	0.000070	0.000105	0.000087	1.000090	0.000012	0.000014	0.000025	0.000064	0.000052
REP.6	0.000013	0.000009	0.000004	0.000004	0.000013	1.000909	0.000030	0.000003	0.000004	0.000008
REP.7	0.000012	0.000007	0.000006	0.000006	0.000018	0.000017	1.02021	0.000002	0.000005	0.000068
REP.8	0.000006	0.000002	0.000010	0.000001	0.000005	0.000001	0.000001	1.02433	0.000002	0.000017
REP.9	0.000012	0.000019	0.000005	0.000001	0.000030	0.000005	0.000002	0.000006	1.00467	1.99340
REP.10	0.000007	0.000004	0.000014	0.000001	0.000095	0.000001	0.000002	0.000041	0.000003	0.000006
REP.11	0.000017	0.000006	0.000003	0.000041	0.000024	0.000001	0.000003	0.000001	0.000002	0.000004
REP.12	0.000011	0.000005	0.000003	0.000041	0.000006	0.000012	0.000001	0.000001	0.000007	0.000002
REP.13	0.000004	0.000002	0.000001	0.000003	0.000031	0.000002	0.000004	0.000001	0.000004	0.000003
REP.14	0.000008	0.000004	0.000005	0.000022	0.000003	0.000002	0.000004	0.000031	0.000002	0.000022
REP.15	0.000005	0.000003	0.000004	0.000001	0.000003	0.000001	0.000001	0.000007	0.000002	

	REP.11	REP.12	REP.13	REP.14	REP.15
REP.1	0.00634	0.00326	0.00104	0.00454	0.00778
REP.2	0.00036	0.00033	0.00026	0.00077	0.00162
REP.3	0.000006	0.00007	0.00005	0.000011	0.000052
REP.4	0.000157	0.000176	0.000011	0.000148	0.000043
REP.5	0.000372	0.000065	0.000012	0.000065	0.000093
REP.6	0.000034	0.000022	0.000121	0.000095	0.000010
REP.7	0.000002	0.000004	0.000133	0.000024	0.000008
REP.8	0.000001	0.000001	0.000003	0.000001	0.000013
REP.9	0.000002	0.000001	0.000001	0.000015	0.000008
REP.10	0.000002	0.000000	0.000001	0.000002	0.000042
REP.11	1.010054	0.000027	0.000002	0.000019	0.000031
REP.12	0.000031	1.02297	0.000022	0.000025	0.000051
REP.13	0.000003	0.000003	1.013369	0.000006	0.000002
REP.14	0.000011	0.000016	0.000004	1.02087	0.000001
REP.15	0.000001	0.000002	0.000001	0.000000	0.99125

POPULATION PROJECTION   1969
********************   ****

REGION	POPULATION ABSOLUTE	PERCENT	GROWTH RATE
REP.1	129419281.	54.02	
REP.2	46854172.	19.56	
REP.3	8926285.	3.73	
REP.4	11442781.	4.78	
REP.5	12774993.	5.33	
REP.6	4615503.	1.93	
REP.7	4988507.	2.08	
REP.8	3102228.	1.29	
REP.9	3522415.	1.47	
REP.10	2364214.	0.99	
REP.11	2859072.	1.19	
REP.12	2807366.	1.17	
REP.13	2448008.	1.02	
REP.14	2094268.	0.87	
REP.15	1358119.	0.57	
TOTAL	239577213.		1929.438591

POPULATION PROJECTION   1970
********************   ****

REGION	POPULATION ABSOLUTE	PERCENT	GROWTH RATE
REP.1	130079210.	53.81	0.508632
REP.2	47126517.	19.50	0.579589
REP.3	9002338.	3.72	0.848413
REP.4	11799429.	4.88	3.069223
REP.5	13008726.	5.38	1.813087
REP.6	4686358.	1.94	1.523492
REP.7	5117081.	2.12	2.544757
REP.8	3128236.	1.29	0.834887
REP.9	3568873.	1.48	1.310300
REP.10	2364127.	0.98	-0.003681
REP.11	2932805.	1.21	2.546234
REP.12	2899602.	1.20	3.232667
REP.13	2491873.	1.03	1.775999
REP.14	2158880.	0.89	3.038539
REP.15	1356079.	0.56	-0.150349
TOTAL	241720134.		0.890495

POPULATION PROJECTION   1975
★★★★★★★★★★★★★★★★★★★★★   ★★★★

REGION	POPULATION ABSOLUTE	PERCENT	GROWTH RATE
REP.1	133489556.	52.78	0.523627
REP.2	48519046.	19.18	0.584365
REP.3	9390504.	3.71	0.841688
REP.4	13723470.	5.43	2.990602
REP.5	14207862.	5.62	1.732203
REP.6	5054475.	2.00	1.505189
REP.7	5804045.	2.29	2.503183
REP.8	3261123.	1.29	0.830227
REP.9	3807950.	1.51	1.288114
REP.10	2365249.	0.94	0.018353
REP.11	3321679.	1.31	2.454690
REP.12	3398890.	1.34	3.142687
REP.13	2722353.	1.08	1.764881
REP.14	2506675.	0.99	2.954885
REP.15	1347060.	0.53	-0.122098
TOTAL	252919936.		0.916214

POPULATION PROJECTION   2019
★★★★★★★★★★★★★★★★★★★★★   ★★★★

REGION	POPULATION ABSOLUTE	PERCENT	GROWTH RATE
REP.1	173689192.	43.37	0.668533
REP.2	63528680.	15.86	0.642002
REP.3	13498342.	3.37	0.818362
REP.4	46199339.	11.54	2.613260
REP.5	27607182.	6.89	1.383148
REP.6	9551447.	2.38	1.408571
REP.7	16485829.	4.12	2.286922
REP.8	4671861.	1.17	0.810480
REP.9	6496786.	1.62	1.164577
REP.10	2499438.	0.62	0.223622
REP.11	8700113.	2.17	2.024309
REP.12	12111759.	3.02	2.732906
REP.13	5828016.	1.46	1.708142
REP.14	8261541.	2.06	2.558323
REP.15	1355907.	0.34	0.139904
TOTAL	400485431.		1.163637

POPULATION PROJECTION   STABILITY
********************   ****

| REGION | POPULATION | | GROWTH |
	ABSOLUTE	PERCENT	RATE
REP.1	3.	13.05	2.357305
REP.2	1.	2.40	2.357299
REP.3	0.	0.50	2.357302
REP.4	11.	43.85	2.357274
REP.5	1.	3.67	2.357298
REP.6	0.	0.44	2.357284
REP.7	1.	2.12	2.357238
REP.8	0.	0.10	2.357300
REP.9	0.	0.26	2.357290
REP.10	0.	0.08	2.357298
REP.11	1.	2.38	2.357295
REP.12	6.	25.60	2.357382
REP.13	0.	0.41	2.357278
REP.14	1.	5.08	2.357231
REP.15	0.	0.05	2.357316
TOTAL	25.		2.357305

Appendix C-2

Multiregional Life Table (U.S.A.)

DATA
****

REGION N. EAST

AGE	POPULATION	BIRTHS	DEATHS	MIGRATION FROM N. EAST TO			
				N. EAST	N.CENTR.	SOUTH	WEST
0	4414026.	0.	27179.	0.	43426.	87576.	52760.
5	3934259.	0.	1766.	0.	27377.	64006.	38909.
10	3532116.	782.	1375.	0.	37187.	93109.	34426.
15	2897064.	85604.	1996.	0.	56718.	136475.	61608.
20	2546495.	293054.	2565.	0.	53667.	88272.	56143.
25	2741453.	286853.	3104.	0.	38668.	73479.	49934.
30	3042131.	192074.	4264.	0.	29307.	63921.	41341.
35	3172608.	94845.	6698.	0.	20740.	50387.	30638.
40	3007205.	22395.	10770.	0.	13864.	38843.	21150.
45	2810404.	1016.	16598.	0.	9105.	32564.	14730.
50	2555222.	26.	24285.	0.	5419.	32112.	11781.
55	2261683.	0.	33954.	0.	5293.	35356.	11243.
60	1956282.	0.	45355.	0.	4627.	42617.	10059.
65	1648137.	0.	57005.	0.	3403.	25712.	6403.
70	1210674.	0.	65202.	0.	2302.	13081.	3569.
75	747463.	0.	63819.	0.	1315.	4721.	1555.
80	392583.	0.	46505.	0.	450.	633.	361.
85	222195.	0.	47798.	0.	0.	0.	0.
TOTAL	43092012.	976649.	460238.	0.	353868.	882864.	446610.

REGION N.CENTR.

AGE	POPULATION	BIRTHS	DEATHS	MIGRATION FROM N.CENTR. TO			
				N. EAST	N.CENTR.	SOUTH	WEST
0	5808585.	0.	35366.	40729.	0.	135633.	148058.
5	5170311.	0.	2500.	25116.	0.	91585.	108413.
10	4468739.	1260.	1852.	27754.	0.	104015.	103501.
15	3584176.	146605.	2851.	49786.	0.	161143.	159737.
20	3120634.	409431.	3587.	44955.	0.	118171.	130533.
25	3229408.	340152.	3901.	35837.	0.	100097.	113932.
30	3435043.	214459.	4749.	27795.	0.	81549.	95461.
35	3499449.	108276.	7052.	19774.	0.	61681.	72683.
40	3261676.	27202.	11085.	13066.	0.	45804.	52073.
45	3043884.	1400.	16621.	8357.	0.	36600.	37411.
50	2747677.	20.	23515.	5741.	0.	34120.	29771.
55	2469530.	0.	32120.	4718.	0.	35790.	27539.
60	2127476.	0.	43003.	3746.	0.	40178.	27569.
65	1839629.	0.	55713.	2908.	0.	24374.	18166.
70	1394182.	0.	66964.	2079.	0.	12523.	10658.
75	906787.	0.	69467.	1262.	0.	4626.	5046.
80	489881.	0.	53839.	457.	0.	679.	1332.
85	279933.	0.	57236.	0.	0.	0.	0.
TOTAL	50877004.	1248805.	491421.	314080.	0.	1088568.	1141883.

REGION   SOUTH

AGE	POPULATION	BIRTHS	DEATHS	MIGRATION FROM N. EAST	N.CENTR.	SOUTH TO SOUTH	WEST
0	6163530.	0.	49713.	71995.	132246.	0.	126059.
5	5647933.	0.	3256.	45442.	86725.	0.	88863.
10	5141402.	3953.	2493.	46136.	90213.	0.	87291.
15	4274172.	234269.	4123.	97391.	166042.	0.	140222.
20	3578654.	452184.	5367.	101726.	167366.	0.	128518.
25	3451579.	325998.	5953.	60998.	92899.	0.	90772.
30	3526343.	203711.	7117.	44732.	67286.	0.	74449.
35	3593365.	105108.	10021.	31005.	47980.	0.	54652.
40	3269247.	27025.	14843.	20595.	33995.	0.	36586.
45	3037928.	1870.	20899.	13683.	24304.	0.	23307.
50	2653354.	42.	27403.	9863.	17849.	0.	15709.
55	2272830.	0.	34209.	8145.	13531.	0.	12541.
60	1845051.	0.	41856.	6278.	9611.	0.	8330.
65	1649226.	0.	50388.	4772.	7349.	0.	5784.
70	1195736.	0.	57640.	3339.	5173.	0.	3645.
75	762700.	0.	57527.	1983.	3088.	0.	1916.
80	404662.	0.	41548.	705.	1093.	0.	599.
85	227288.	0.	42560.	0.	0.	0.	0.
TOTAL	52695012.	1354160.	476896.	568788.	966750.	0.	899243.

REGION   WEST

AGE	POPULATION	BIRTHS	DEATHS	MIGRATION FROM N. EAST	N.CENTR.	WEST TO SOUTH	WEST
0	2915171.	0.	19800.	22292.	54440.	76150.	0.
5	2614842.	0.	1395.	13656.	32646.	49821.	0.
10	2271990.	691.	994.	10365.	26188.	42332.	0.
15	1813828.	90664.	1758.	20186.	46920.	69044.	0.
20	1664498.	221704.	2305.	30822.	71477.	79757.	0.
25	1722443.	159988.	2447.	20106.	40471.	55212.	0.
30	1607775.	106100.	2837.	15121.	30684.	46148.	0.
35	1888022.	52363.	4086.	10074.	21925.	33037.	0.
40	1701431.	12588.	6246.	6002.	14796.	20926.	0.
45	1536654.	760.	8917.	3433.	10072.	12729.	0.
50	1314689.	8.	11730.	2372.	7699.	9219.	0.
55	1128915.	0.	14806.	2313.	6991.	9040.	0.
60	948349.	0.	18745.	1633.	6492.	6832.	0.
65	817315.	0.	23853.	1216.	4800.	4464.	0.
70	621546.	0.	28859.	836.	3261.	2589.	0.
75	397038.	0.	29865.	490.	1875.	1211.	0.
80	208765.	0.	21215.	179.	639.	325.	0.
85	116730.	0.	22928.	0.	0.	0.	0.
TOTAL	25490006.	644946.	222786.	161096.	381576.	518836.	0.

MULTIREGIONAL LIFE TABLE OPTION 1
■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■

PROBABILITIES OF DYING AND MIGRATING
****

REGION   N. EAST
****

| AGE | DEATH | MIGRATION FROM N. EAST TO | | | |
		N. EAST	N.CENTR.	SOUTH	WEST
0	0.029711	0.930112	0.009494	0.019147	0.011535
5	0.002205	0.965253	0.006838	0.015986	0.009718
10	0.001900	0.952570	0.010279	0.025736	0.009515
15	0.003294	0.912598	0.018722	0.045049	0.020336
20	0.004836	0.920471	0.020237	0.033286	0.021170
25	0.005484	0.937249	0.013662	0.025962	0.017643
30	0.006833	0.950037	0.009393	0.020487	0.013250
35	0.010336	0.958258	0.006401	0.015550	0.009455
40	0.017535	0.958416	0.004514	0.012648	0.006887
45	0.028815	0.951603	0.003161	0.011307	0.005114
50	0.045975	0.934975	0.002430	0.012159	0.004461
55	0.071557	0.906571	0.002231	0.014902	0.004739
60	0.108074	0.864617	0.002205	0.020310	0.004794
65	0.157611	0.822749	0.001882	0.014218	0.003541
70	0.235700	0.750598	0.001664	0.009457	0.002580
75	0.350344	0.641322	0.001444	0.005183	0.001707
80	0.456318	0.540848	0.000883	0.001242	0.000708
85	1.000000	0.000000	0.000000	0.000000	0.000000

REGION   N.CENTR.
****

| AGE | DEATH | MIGRATION FROM N.CENTR. TO | | | |
		N. EAST	N.CENTR.	SOUTH	WEST
0	0.029184	0.006722	0.917275	0.022385	0.024435
5	0.002363	0.004749	0.955075	0.017316	0.020497
10	0.002017	0.006045	0.946737	0.022656	0.022544
15	0.003775	0.013183	0.898078	0.042668	0.042296
20	0.005474	0.013721	0.904898	0.036067	0.039840
25	0.005798	0.010653	0.919928	0.029755	0.033867
30	0.006690	0.007831	0.935607	0.022976	0.026896
35	0.009810	0.005502	0.947304	0.017162	0.020223
40	0.016570	0.003906	0.950262	0.013694	0.015568
45	0.026580	0.002673	0.947076	0.011706	0.011965
50	0.041381	0.002021	0.934112	0.012009	0.010478
55	0.062155	0.001826	0.911509	0.013851	0.010658
60	0.094690	0.001650	0.873826	0.017694	0.012141
65	0.139169	0.001453	0.838126	0.012177	0.009076
70	0.212689	0.001321	0.771265	0.007955	0.006770
75	0.319855	0.001162	0.670078	0.004260	0.004647
80	0.430222	0.000730	0.565834	0.001085	0.002129
85	1.000000	0.000000	0.000000	0.000000	0.000000

REGION   SOUTH
★★★★★★★★★★★★★★★

AGE	DEATH	MIGRATION FROM		SOUTH TO	
		N. EAST	N.CENTR.	SOUTH	WEST
0	0.038524	0.011157	0.020494	0.910295	0.019535
5	0.002823	0.007880	0.015039	0.958847	0.015410
10	0.002370	0.008772	0.017153	0.955108	0.016597
15	0.004595	0.021709	0.037011	0.905430	0.051256
20	0.007079	0.026834	0.044150	0.888035	0.033902
25	0.008294	0.016997	0.025886	0.923530	0.025293
30	0.009783	0.012298	0.018499	0.938953	0.020468
35	0.013596	0.008413	0.013020	0.950141	0.014830
40	0.022141	0.006144	0.010142	0.950658	0.010915
45	0.033483	0.004384	0.007788	0.946877	0.007468
50	0.049940	0.003595	0.006506	0.934233	0.005726
55	0.072005	0.003429	0.005695	0.913591	0.005279
60	0.106629	0.003200	0.004899	0.881025	0.004246
65	0.141210	0.002675	0.004119	0.848754	0.003242
70	0.214130	0.002481	0.003843	0.776838	0.002708
75	0.316079	0.002179	0.003393	0.676244	0.002105
80	0.407549	0.001383	0.002144	0.587749	0.001175
85	1.000000	0.000000	0.000000	0.000000	0.000000

REGION   WEST
★★★★★★★★★★★★★★★

AGE	DEATH	MIGRATION FROM		WEST TO	
		N. EAST	N.CENTR.	SOUTH	WEST
0	0.032554	0.007330	0.017901	0.025040	0.917174
5	0.002616	0.005122	0.012244	0.018685	0.961334
10	0.002148	0.004479	0.011318	0.018295	0.963761
15	0.004660	0.010701	0.024874	0.036603	0.923162
20	0.006544	0.017500	0.040582	0.045283	0.890091
25	0.006849	0.011255	0.022654	0.030906	0.928336
30	0.007622	0.008125	0.016596	0.024798	0.942858
35	0.010581	0.005218	0.011356	0.017111	0.955734
40	0.017970	0.003454	0.008514	0.012041	0.958022
45	0.028361	0.002184	0.006407	0.008097	0.954952
50	0.043327	0.001752	0.005688	0.006810	0.942423
55	0.062999	0.001968	0.005949	0.007693	0.921391
60	0.093474	0.001629	0.006475	0.006814	0.891610
65	0.135192	0.001378	0.005441	0.005060	0.852928
70	0.207012	0.001199	0.004678	0.003714	0.783396
75	0.315372	0.001035	0.003960	0.002558	0.677076
80	0.404289	0.000682	0.002435	0.001239	0.591354
85	1.000000	0.000000	0.000000	0.000000	0.000000

EXPECTATIONS OF LIFE
★★★★★★★★★★★★★★★★★★★★★★★

AGE AGGREGATED	AGE	INITIAL REGION OF COHORT N. EAST				
★★★ ★★★★★★★★★★	**★★★**	**★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★**				
		TOTAL	N. EAST	N.CENTR.	SOUTH	WEST
0	0	69.764743	50.895092	4.487430	8.881998	5.500228
0 69.753777						
5 67.011642	5	66.824463	47.480515	4.600377	9.104641	5.638929
10 62.173611	10	61.967842	42.865561	4.545167	8.988706	5.568471
15 57.299431	15	57.082455	38.410072	4.448083	8.774325	5.449973
20 52.525791	20	52.269974	34.287125	4.291037	8.422037	5.269770
25 47.829442	25	47.528118	30.530834	4.050982	7.938100	5.008201
30 43.154271	30	42.796204	27.019306	3.739474	7.366596	4.670824
35 38.453819	35	38.091431	23.691626	3.369035	6.734105	4.276663
40 33.859779	40	33.479532	20.537024	3.021168	6.070858	3.850281
45 29.456968	45	29.053326	17.576872	2.653484	5.407825	3.415143
50 25.274904	50	24.855283	14.813561	2.295269	4.761086	2.985167
55 21.354620	55	20.931393	12.263703	1.954495	4.141690	2.571505
60 17.711620	60	17.315487	9.947577	1.636223	3.551826	2.179861
65 14.411677	65	14.052306	7.901873	1.346554	2.988807	1.815073
70 11.309561	70	11.092256	6.097870	1.081592	2.440634	1.472159
75 8.839340	75	8.595100	4.604182	0.855433	1.959440	1.176044
80 6.868171	80	6.673639	3.459960	0.676766	1.589873	0.947040
85 5.242656	85	4.898149	2.423621	0.501004	1.247613	0.725911

AGE	INITIAL REGION OF COHORT N.CENTR.				
★★★	**★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★**				
	TOTAL	N. EAST	N.CENTR.	SOUTH	WEST
0	70.322449	3.176054	48.447926	9.102184	9.596285
5	67.361252	3.254220	44.967041	9.318161	9.821834
10	62.515938	3.215859	40.443378	9.184744	9.671956
15	57.638536	3.151063	36.107903	8.957619	9.421752
20	52.852619	3.048269	32.140842	8.609833	9.053673
25	48.141815	2.888515	28.569946	8.130262	8.553087
30	43.426865	2.675116	25.263601	7.547034	7.941114
35	38.725731	2.426231	22.162771	6.890222	7.246507
40	34.110977	2.158474	19.249237	6.196160	6.507106
45	29.681820	1.886652	16.536200	5.499746	5.759221
50	25.469467	1.618649	14.012278	4.817175	5.021373
55	21.513399	1.361216	11.682590	4.160018	4.309574
60	17.827358	1.118107	9.549682	3.529099	3.630472
65	14.483102	0.896780	7.657426	2.931473	2.997420
70	11.433211	0.696198	5.976508	2.358256	2.402249
75	8.855079	0.526714	4.579019	1.860279	1.889067
80	6.846549	0.392891	3.493009	1.473975	1.486674
85	5.015464	0.270842	2.504571	1.128338	1.111713

AGE   INITIAL REGION OF COHORT   SOUTH
***   *********************************

AGE	TOTAL	N. EAST	N.CENTR.	SOUTH	WEST
0	68.983154	4.583579	7.523644	49.210182	7.665545
5	66.646652	4.738200	7.771988	46.214607	7.921854
10	61.826889	4.675123	7.652834	41.692677	7.806255
15	56.966106	4.572570	7.459383	37.321083	7.613149
20	52.213596	4.415681	7.171666	33.293877	7.332371
25	47.554546	4.170699	6.743551	29.698769	6.941526
30	42.953603	3.847502	6.201430	26.462378	6.452294
35	38.267155	3.480316	5.606462	23.288223	5.892152
40	33.717209	3.092016	4.990940	20.342587	5.291667
45	29.366728	2.705243	4.382698	17.596804	4.683982
50	25.235531	2.322174	3.790328	15.039426	4.083603
55	21.364952	1.957152	3.224153	12.678603	3.505042
60	17.765453	1.612304	2.688951	10.510645	2.953553
65	14.516159	1.298337	2.200885	8.574163	2.442773
70	11.496075	1.007575	1.744908	6.758354	1.955237
75	8.955913	0.762088	1.357399	5.299032	1.537393
80	6.989020	0.567058	1.046588	4.167342	1.208032
85	5.170699	0.385913	0.746151	3.146059	0.892576

AGE   INITIAL REGION OF COHORT   WEST
***   *********************************

AGE	TOTAL	N. EAST	N.CENTR.	SOUTH	WEST
0	69.944733	3.176533	6.604594	8.947643	51.215961
5	67.214203	3.264479	6.780575	9.184018	47.985130
10	62.383766	3.222807	6.677464	9.035492	43.448002
15	57.512814	3.156972	6.518409	8.799498	39.037933
20	52.766953	3.063548	6.298662	8.470304	34.934498
25	48.094864	2.910928	5.955396	8.002712	31.225828
30	43.410110	2.695883	5.495101	7.409788	27.809336
35	38.730953	2.443479	4.979821	6.738159	24.569492
40	34.131588	2.171780	4.440481	6.025784	21.493542
45	29.725994	1.897439	3.904464	5.313626	18.610464
50	25.539696	1.628043	3.361760	4.619745	15.910146
55	21.609529	1.369879	2.881468	3.957615	13.400566
60	17.938187	1.125250	2.406183	3.327339	11.079412
65	14.595139	0.901344	1.967731	2.739900	8.986163
70	11.535900	0.697794	1.562173	2.188885	7.087048
75	8.951268	0.525874	1.214711	1.717232	5.493451
80	6.963475	0.390969	0.937961	1.356540	4.278005
85	5.086320	0.264851	0.666317	1.021255	3.133898

Appendix C-3

Multiregional Population Projection (U.S.A.)

CHARACTERISTICS OF MULTIREGIONAL MOBILITY AND NET MATERNITY FUNCTION
****
****

RADICES OF STATIONARY POPULATION
****

	N. EAST	N.CENTR.	SOUTH	WEST
	100000.	100000.	100000.	100000.

INTEGRALS OF GENERALIZED MOBILITY FUNCTION
****

REGION   N. EAST
****

AGE	OUTMIG.	N. EAST	N.CENTR.	SOUTH	WEST
0	0.008326	0.040175	0.000265	0.000513	0.000302
5	0.006623	0.030270	0.000552	0.001032	0.000591
10	0.009327	0.040899	0.001077	0.001948	0.000867
15	0.017590	0.072072	0.003432	0.006956	0.002876
20	0.015557	0.058632	0.004729	0.011232	0.006054
25	0.011824	0.041587	0.004946	0.008354	0.004702
30	0.008847	0.029488	0.004259	0.006864	0.004129
35	0.006415	0.020475	0.003335	0.005124	0.003047
40	0.004912	0.015067	0.002646	0.003972	0.002281
45	0.004014	0.011785	0.002114	0.002913	0.001622
50	0.003938	0.010927	0.001945	0.002362	0.001391
55	0.004589	0.011749	0.002027	0.002145	0.001503
60	0.005858	0.013320	0.002291	0.001820	0.001585
65	0.004310	0.008297	0.001495	0.001405	0.001024
70	0.003131	0.004771	0.000914	0.001129	0.000727
75	0.002031	0.002182	0.000456	0.000771	0.000459
80	0.000736	0.000477	0.000123	0.000325	0.000182
85	0.000000	0.000000	0.000000	0.000000	0.000000
TOTAL	0.118028	0.412172	0.036607	0.058866	0.033142

REGION   N.CENTR.
****

AGE	OUTMIG.	N. EAST	N.CENTR.	SOUTH	WEST
0	0.011170	0.000140	0.053540	0.000600	0.000641
5	0.008708	0.000296	0.039056	0.001180	0.001234
10	0.010530	0.000643	0.044964	0.002067	0.001812
15	0.020683	0.001948	0.081792	0.006958	0.005849
20	0.018820	0.002640	0.067660	0.011253	0.011572
25	0.015474	0.002603	0.051300	0.008551	0.008511
30	0.011924	0.002243	0.036998	0.007111	0.007247
35	0.008809	0.001760	0.025925	0.005334	0.005256
40	0.006803	0.001401	0.019113	0.004139	0.003896
45	0.005412	0.001155	0.014499	0.003031	0.002755
50	0.005068	0.001112	0.012829	0.002447	0.002354
55	0.005511	0.001235	0.012933	0.002207	0.002534
60	0.006721	0.001444	0.014156	0.001851	0.002329
65	0.004941	0.000925	0.008960	0.001413	0.001720
70	0.003624	0.000547	0.005330	0.001127	0.001221
75	0.002412	0.000257	0.002591	0.000766	0.000771
80	0.001008	0.000058	0.000683	0.000323	0.000306
85	0.000000	0.000000	0.000000	0.000000	0.000000
TOTAL	0.147618	0.020407	0.492329	0.060356	0.060009

REGION   SOUTH
★★★★★★★★★★★★★★★

AGE	OUTMIG.	N. EAST	N.CENTR.	SOUTH	WEST
0	0.010718	0.000232	0.000572	0.051186	0.000512
5	0.007827	0.000485	0.001177	0.034909	0.000972
10	0.008700	0.001013	0.002130	0.037194	0.001404
15	0.018888	0.002976	0.006332	0.075481	0.004508
20	0.022221	0.004050	0.008495	0.080350	0.009126
25	0.014177	0.003945	0.008631	0.046918	0.006851
30	0.010576	0.003306	0.007217	0.032970	0.005662
35	0.007438	0.002546	0.005551	0.022127	0.004269
40	0.005578	0.002003	0.004359	0.015906	0.003168
45	0.004035	0.001639	0.003463	0.010996	0.002237
50	0.003273	0.001571	0.003175	0.008447	0.001904
55	0.003011	0.001739	0.003300	0.007237	0.002039
60	0.002625	0.002027	0.003712	0.005719	0.001858
65	0.002171	0.001295	0.002408	0.004134	0.001359
70	0.002033	0.000763	0.001465	0.003180	0.000958
75	0.001832	0.000357	0.000728	0.002110	0.000602
80	0.001185	0.000080	0.000196	0.000877	0.000239
85	0.000000	0.000000	0.000000	0.000000	0.000000
TOTAL	0.126288	0.030026	0.062912	0.439740	0.047869

REGION   WEST
★★★★★★★★★★★★★★★

AGE	OUTMIG.	N. EAST	N.CENTR.	SOUTH	WEST
0	0.010489	0.000153	0.000500	0.000671	0.050273
5	0.007352	0.000321	0.001016	0.001303	0.033079
10	0.006944	0.000654	0.001759	0.002140	0.030112
15	0.015012	0.001821	0.004954	0.006695	0.061634
20	0.021875	0.002557	0.006887	0.011063	0.081996
25	0.013445	0.002630	0.007338	0.008691	0.046184
30	0.010195	0.002271	0.006247	0.007242	0.033079
35	0.006889	0.001778	0.004859	0.005432	0.021402
40	0.004905	0.001410	0.003839	0.004194	0.014687
45	0.003414	0.001158	0.003061	0.003043	0.009834
50	0.002935	0.001111	0.002616	0.002425	0.008058
55	0.003250	0.001233	0.002943	0.002155	0.008355
60	0.003154	0.001441	0.003342	0.001770	0.007389
65	0.002564	0.000923	0.002192	0.001323	0.005268
70	0.002151	0.000545	0.001345	0.001043	0.003641
75	0.001801	0.000256	0.000673	0.000705	0.002252
80	0.001095	0.000057	0.000182	0.000296	0.000882
85	0.000000	0.000000	0.000000	0.000000	0.000000
TOTAL	0.117470	0.020317	0.053952	0.060189	0.418124

0 MOMENT
*****

	TOTAL	N. EAST	N.CENTR.	SOUTH	WEST
N. EAST	0.482921	0.412172	0.020407	0.030026	0.020317
N.CENTR.	0.645800	0.036607	0.492329	0.062912	0.053952
SOUTH	0.619151	0.058866	0.060356	0.439740	0.060189
WEST	0.559144	0.033142	0.060009	0.047869	0.418124
TOTAL		0.540786	0.633102	0.580547	0.552583
EIGEN 1	0.588469	1.000000	3.084249	2.443785	1.967814

1 MOMENT
*****

	TOTAL	N. EAST	N.CENTR.	SOUTH	WEST
N. EAST	13.354825	10.685198	0.775411	1.120553	0.773664
N.CENTR.	18.255905	1.371620	12.579202	2.298388	2.006694
SOUTH	16.362389	1.984376	2.031373	10.335795	2.010844
WEST	15.032622	1.172717	2.063897	1.651179	10.144829
TOTAL		15.213912	17.449883	15.405915	14.936030
EIGEN 1	16.018459	1.000000	2.583415	1.848430	1.627053

2 MOMENT
*****

	TOTAL	N. EAST	N.CENTR.	SOUTH	WEST
N. EAST	528.222900	405.515472	35.814484	51.113239	35.779682
N.CENTR.	729.087769	62.327332	472.893097	162.820801	91.046577
SOUTH	600.468079	82.597725	84.441048	350.589935	82.839424
WEST	565.924194	50.791821	87.677658	70.142166	357.312561
TOTAL		601.232361	680.826294	574.666138	566.978271
EIGEN 1	617.416443	1.000000	2.379457	1.497593	1.401215

MEANS
*****

	TOTAL	N. EAST	N.CENTR.	SOUTH	WEST
N. EAST	34.830200	25.924145	37.996437	37.319786	38.080433
N.CENTR.	34.186684	37.469090	25.550375	36.533421	37.193844
SOUTH	31.069895	33.710274	33.656307	23.504324	33.408669
WEST	32.133530	35.384708	34.393333	34.493366	24.262701
TOTAL		33.122055	32.899117	32.962727	33.236412
EIGEN 1	132.219162	1.000000	0.983190	0.899790	0.928491

VARIANCES
****

	N. EAST	N.CENTR.	SOUTH	WEST
N. EAST	311.789673	311.241333	309.550171	310.989624
N.CENTR.	298.687622	307.700012	299.670044	304.155884
SOUTH	266.774658	266.294067	244.812866	260.176025
WEST	280.477539	278.182617	275.487427	265.881653

INTEGRALS OF GENERALIZED NET MATERNITY FUNCTION
****

REGION   N. EAST
****

AGE	FERTILITY	N. EAST	N.CENTR.	SOUTH	WEST
0	0.000000	0.000000	0.000000	0.000000	0.000000
5	0.000000	0.000000	0.000000	0.000000	0.000000
10	0.000221	0.000969	0.000029	0.000172	0.000038
15	0.029549	0.121071	0.006788	0.020185	0.009575
20	0.115081	0.433725	0.052970	0.063867	0.036864
25	0.104635	0.368023	0.053666	0.055655	0.032460
30	0.063138	0.210447	0.022501	0.037490	0.023787
35	0.029895	0.095415	0.011713	0.020151	0.012268
40	0.007447	0.022843	0.003244	0.005886	0.003440
45	0.000362	0.001063	0.000180	0.000445	0.000235
50	0.000010	0.000028	0.000003	0.000012	0.000003
55	0.000000	0.000000	0.000000	0.000000	0.000000
60	0.000000	0.000000	0.000000	0.000000	0.000000
65	0.000000	0.000000	0.000000	0.000000	0.000000
70	0.000000	0.000000	0.000000	0.000000	0.000000
75	0.000000	0.000000	0.000000	0.000000	0.000000
80	0.000000	0.000000	0.000000	0.000000	0.000000
85	0.000000	0.000000	0.000000	0.000000	0.000000
TOTAL	0.350338	1.253583	0.110694	0.203863	0.118691

REGION   N.CENTR.
****

AGE	FERTILITY	N. EAST	N.CENTR.	SOUTH	WEST
0	0.000000	0.000000	0.000000	0.000000	0.000000
5	0.000000	0.000000	0.000000	0.000000	0.000000
10	0.000282	0.000015	0.001204	0.000183	0.000079
15	0.040903	0.003273	0.161753	0.020190	0.019476
20	0.131201	0.019528	0.471683	0.063990	0.070459
25	0.105330	0.023039	0.349196	0.056968	0.058798
30	0.062433	0.016006	0.193720	0.038842	0.041749
35	0.030941	0.008201	0.091060	0.020976	0.021161
40	0.008340	0.002125	0.023431	0.006133	0.005877
45	0.000460	0.000104	0.001232	0.000463	0.000400
50	0.000007	0.000003	0.000018	0.000012	0.000005
55	0.000000	0.000000	0.000000	0.000000	0.000000
60	0.000000	0.000000	0.000000	0.000000	0.000000
65	0.000000	0.000000	0.000000	0.000000	0.000000
70	0.000000	0.000000	0.000000	0.000000	0.000000
75	0.000000	0.000000	0.000000	0.000000	0.000000
80	0.000000	0.000000	0.000000	0.000000	0.000000
85	0.000000	0.000000	0.000000	0.000000	0.000000
TOTAL	0.379897	0.072294	1.293297	0.207757	0.218003

REGION   SOUTH
★★★★★★★★★★★★★★★

AGE	FERTILITY	N. EAST	N.CENTR.	SOUTH	WEST
0	0.000000	0.000000	0.000000	0.000000	0.000000
5	0.000000	0.000000	0.000000	0.000000	0.000000
10	0.000769	0.000024	0.000057	0.003288	0.000061
15	0.054810	0.004999	0.012523	0.219034	0.015011
20	0.126356	0.029959	0.059224	0.456896	0.055568
25	0.094449	0.034909	0.058752	0.312575	0.047333
30	0.057768	0.023596	0.037789	0.180086	0.033771
35	0.029251	0.011865	0.019498	0.087016	0.017186
40	0.008266	0.003036	0.005344	0.023571	0.004778
45	0.000616	0.000148	0.000294	0.001679	0.000324
50	0.000016	0.000004	0.000004	0.000041	0.000004
55	0.000000	0.000000	0.000000	0.000000	0.000000
60	0.000000	0.000000	0.000000	0.000000	0.000000
65	0.000000	0.000000	0.000000	0.000000	0.000000
70	0.000000	0.000000	0.000000	0.000000	0.000000
75	0.000000	0.000000	0.000000	0.000000	0.000000
80	0.000000	0.000000	0.000000	0.000000	0.000000
85	0.000000	0.000000	0.000000	0.000000	0.000000
TOTAL	0.372301	0.108540	0.193485	1.284186	0.174037

REGION   WEST
★★★★★★★★★★★★★★★

AGE	FERTILITY	N. EAST	N.CENTR.	SOUTH	WEST
0	0.000000	0.000000	0.000000	0.000000	0.000000
5	0.000000	0.000000	0.000000	0.000000	0.000000
10	0.000304	0.000015	0.000047	0.000189	0.001318
15	0.049985	0.003059	0.009797	0.019428	0.205220
20	0.133196	0.018914	0.048010	0.062907	0.499273
25	0.092884	0.023270	0.049950	0.057900	0.319059
30	0.058735	0.016206	0.032710	0.039555	0.190572
35	0.027734	0.008288	0.017068	0.021361	0.086163
40	0.007398	0.002138	0.004706	0.006215	0.022151
45	0.000495	0.000104	0.000260	0.000465	0.001426
50	0.000006	0.000003	0.000004	0.000012	0.000016
55	0.000000	0.000000	0.000000	0.000000	0.000000
60	0.000000	0.000000	0.000000	0.000000	0.000000
65	0.000000	0.000000	0.000000	0.000000	0.000000
70	0.000000	0.000000	0.000000	0.000000	0.000000
75	0.000000	0.000000	0.000000	0.000000	0.000000
80	0.000000	0.000000	0.000000	0.000000	0.000000
85	0.000000	0.000000	0.000000	0.000000	0.000000
TOTAL	0.370737	0.071997	0.162553	0.208032	1.325198

0 MOMENT
*****

	TOTAL	N. EAST	N.CENTR.	SOUTH	WEST
N. EAST	1.506414	1.253583	0.072294	0.108540	0.071997
N.CENTR.	1.760229	0.110894	1.293297	0.193485	0.162553
SOUTH	1.903838	0.203863	0.207757	1.284186	0.208032
WEST	1.835929	0.118691	0.218003	0.174037	1.325198
TOTAL		1.687031	1.791351	1.760248	1.767780
EIGEN 1	1.760050	1.000000	1.818484	2.109245	2.028763

1 MOMENT
*****

	TOTAL	N. EAST	N.CENTR.	SOUTH	WEST
N. EAST	40.626774	33.450630	2.053555	3.069931	2.052657
N.CENTR.	46.835125	3.097383	33.827419	5.368722	4.541602
SOUTH	49.936310	5.568905	5.694238	32.949741	5.723427
WEST	48.071217	3.281355	5.963442	4.776121	34.050297
TOTAL		45.398273	47.538654	46.164516	46.367981
EIGEN 1	46.467079	1.000000	1.699380	1.893753	1.808867

2 MOMENT
*****

	TOTAL	N. EAST	N.CENTR.	SOUTH	WEST
N. EAST	1147.676880	935.315552	60.833832	90.538383	60.989098
N.CENTR.	1309.607422	90.534676	930.415344	155.919540	132.737946
SOUTH	1384.680908	160.234055	164.367966	894.340149	165.738785
WEST	1327.366333	95.293594	171.496750	137.745422	922.830627
TOTAL		1281.377808	1327.113892	1278.543579	1282.296509
EIGEN 1	1293.036621	1.000000	1.609925	1.753926	1.655796

MEANS
****

	TOTAL	N. EAST	N.CENTR.	SOUTH	WEST
N. EAST	27.970961	26.684021	28.405594	28.283903	28.512324
N.CENTR.	27.443436	27.931131	26.155947	27.747435	27.939220
SOUTH	26.973841	27.316887	27.408186	25.658072	27.512211
WEST	27.034697	27.646223	27.354925	27.443140	25.694492
TOTAL		27.394567	27.331163	27.283136	27.414064
EIGEN 1	109.424042	1.000000	0.981442	0.964863	0.967070

VARIANCES
****

	N. EAST	N.CENTR.	SOUTH	WEST
N. EAST	34.076904	34.600220	34.169495	34.268005
N.CENTR.	36.262390	35.279724	35.926636	35.982971
SOUTH	39.776306	39.946838	38.088989	39.775879
WEST	38.558228	38.381348	38.346252	36.164795

MULTIREGIONAL POPULATION PROJECTION
****

TOLERANCE LEVEL FOR EIGENVALUE 0.0000001

YEAR 1963

AGE	TOTAL	N. EAST	N.CENTR.	SOUTH	WEST
0	21371188.	4777069.	6219610.	6904673.	3469836.
5	18955698.	4291929.	5625184.	6013862.	3024724.
10	17327038.	3860200.	5071956.	5638456.	2756427.
15	15366477.	3433503.	4354986.	5115945.	2462043.
20	12505803.	2832875.	3520858.	4162823.	1989247.
25	10840932.	2505733.	3068455.	3481449.	1785295.
30	11064210.	2683869.	3137715.	3410920.	1831706.
35	11699245.	2973986.	3338452.	3492374.	1894433.
40	11972155.	3091252.	3397839.	3541410.	1941654.
45	10969728.	2904839.	3147917.	3196426.	1720546.
50	10039803.	2673818.	2902360.	2938084.	1525541.
55	8749313.	2370930.	2566279.	2531451.	1280654.
60	7449715.	2018967.	2230465.	2126917.	1073365.
65	6039589.	1663506.	1841463.	1668868.	865752.
70	4890996.	1310034.	1499151.	1386621.	695189.
75	3246224.	857062.	1022517.	895556.	471089.
80	1781452.	452571.	573936.	494485.	260460.
85	1085254.	257038.	347680.	321089.	159448.
TOT	185354832.	44959184.	53866824.	57321408.	29207410.
M.AGE	31.5091	33.1329	31.7709	30.3578	30.7859

PERCENTAGE DISTRIBUTION

AGE	TOTAL	N. EAST	N.CENTR.	SOUTH	WEST
0	11.5299	10.6253	11.5463	12.0455	11.8800
5	10.2267	9.5463	10.4428	10.4915	10.3560
10	9.3480	8.5860	9.4157	9.8366	9.4374
15	8.2903	7.6369	8.0847	8.9250	8.4295
20	6.7470	6.3010	6.5362	7.2622	6.8108
25	5.8487	5.5734	5.6964	6.0736	6.1125
30	5.9692	5.9696	5.8249	5.9505	6.2714
35	6.3118	6.6149	6.1976	6.0926	6.4861
40	6.4590	6.8757	6.3079	6.1782	6.6478
45	5.9182	6.4611	5.8439	5.5763	5.8908
50	5.4165	5.9472	5.3880	5.1256	5.2231
55	4.7203	5.2735	4.7641	4.4162	4.3847
60	4.0192	4.4907	4.1407	3.7105	3.6750
65	3.2584	3.7000	3.4185	2.9114	2.9642
70	2.6387	2.9138	2.7831	2.4190	2.3802
75	1.7514	1.9063	1.8982	1.5623	1.6129
80	0.9611	1.0066	1.0655	0.8627	0.8918
85	0.5855	0.5717	0.6454	0.5602	0.5459

AGE	TOTAL	N. EAST	N.CENTR.	SOUTH	WEST
0	100.0000	22.3528	29.1028	32.3083	16.2360
5	100.0000	22.6419	29.6754	31.7259	15.9568
10	100.0000	22.2785	29.2719	32.5414	15.9082
15	100.0000	22.3441	28.3408	33.2929	16.0222
20	100.0000	22.6525	28.1538	33.2871	15.9066
25	100.0000	23.1136	28.3043	32.1139	16.4681
30	100.0000	24.2572	28.3591	30.8284	16.5552
35	100.0000	25.4203	28.5356	29.8513	16.1928
40	100.0000	25.8203	28.3812	29.5804	16.2181
45	100.0000	26.4805	28.6964	29.1386	15.6845
50	100.0000	26.6322	28.9085	29.2644	15.1949
55	100.0000	27.0985	29.3312	28.9331	14.6372
60	100.0000	27.1013	29.9403	28.5503	14.4081
65	100.0000	27.5434	30.4899	27.6321	14.3346
70	100.0000	26.7846	30.6512	28.3505	14.2137
75	100.0000	26.4018	31.4987	27.5876	14.5119
80	100.0000	25.4046	32.2173	27.7574	14.6206
85	100.0000	23.6846	32.0367	29.5865	14.6923

YEAR	1963				
SHA	100.	24.255739	29.061460	30.925230	15.757566
LAM	1.076680	1.043330	1.058766	1.087796	1.145838

YEAR 1968

AGE	TOTAL	N. EAST	N.CENTR.	SOUTH	WEST
0	23323026.	4957549.	6692346.	7633643.	4039487.
5	20987650.	4648797.	6034502.	6732759.	3571593.
10	18911732.	4210659.	5518290.	6012742.	3170042.
15	17273288.	3756590.	4938627.	5622771.	2955301.
20	15288753.	3364490.	4281602.	4995677.	2646984.
25	12426062.	2794161.	3469325.	4044306.	2118270.
30	10761991.	2461056.	2987644.	3430703.	1882588.
35	10958817.	2629174.	3054281.	3371405.	1903957.
40	11524552.	2899442.	3242905.	3440236.	1941969.
45	11684342.	2987668.	3281653.	3459813.	1955208.
50	10560456.	2764151.	3002734.	3090888.	1702683.
55	9474823.	2481864.	2712305.	2799714.	1480941.
60	8014067.	2117113.	2319444.	2363667.	1213843.
65	6543161.	1717654.	1931872.	1916298.	977336.
70	4961392.	1322292.	1500977.	1403052.	735070.
75	3591238.	927625.	1099985.	1037039.	526590.
80	2055576.	518966.	647375.	580438.	308798.
85	1294903.	296359.	407395.	392314.	198835.
TOT	199635840.	46855612.	57123260.	62327464.	33329496.
M.AGE	31.0982	32.7492	31.2756	30.1613	30.2250

PERCENTAGE DISTRIBUTION

AGE	TOTAL	N. EAST	N.CENTR.	SOUTH	WEST
0	11.6828	10.5805	11.7156	12.2476	12.1199
5	10.5130	9.9215	10.5640	10.8022	10.7160
10	9.4731	8.9865	9.6603	9.6470	9.5112
15	8.6524	8.0174	8.6456	9.0213	8.8669
20	7.6583	7.1805	7.4954	8.0152	7.9419
25	6.2244	5.9633	6.0734	6.4888	6.3555
30	5.3908	5.2524	5.2302	5.5043	5.6484
35	5.4894	5.6112	5.3468	5.4092	5.7125
40	5.7728	6.1880	5.6770	5.5196	5.8266
45	5.8528	6.3763	5.7449	5.5510	5.8663
50	5.2899	5.8993	5.2566	4.9591	5.1086
55	4.7461	5.2968	4.7482	4.4919	4.4433
60	4.0143	4.5184	4.0604	3.7923	3.6419
65	3.2775	3.6658	3.3819	3.0746	2.9323
70	2.4852	2.8221	2.6276	2.2511	2.2055
75	1.7989	1.9798	1.9256	1.6639	1.5800
80	1.0297	1.1076	1.1333	0.9313	0.9265
85	0.6486	0.6325	0.7132	0.6294	0.5966

AGE	TOTAL	N. EAST	N.CENTR.	SOUTH	WEST
0	100.0000	21.2560	28.6942	32.7301	17.3197
5	100.0000	22.1502	28.7526	32.0796	17.0176
10	100.0000	22.2648	29.1792	31.7937	16.7623
15	100.0000	21.7480	28.5911	32.5518	17.1091
20	100.0000	22.0063	28.0049	32.6755	17.3133
25	100.0000	22.4863	27.9197	32.5470	17.0470
30	100.0000	22.8680	27.7611	31.8780	17.4929
35	100.0000	23.9914	27.8705	30.7643	17.3738
40	100.0000	25.1588	28.1391	29.8514	16.8507
45	100.0000	25.5698	28.0859	29.6107	16.7336
50	100.0000	26.1745	28.4338	29.2685	16.1232
55	100.0000	26.1943	28.6264	29.5490	15.6303
60	100.0000	26.4175	28.9422	29.4940	15.1464
65	100.0000	26.2511	29.5251	29.2870	14.9368
70	100.0000	26.6516	30.2531	28.2794	14.8158
75	100.0000	25.8302	30.6297	28.8769	14.6632
80	100.0000	25.2467	31.4936	28.2372	15.0225
85	100.0000	22.8866	31.4614	30.2968	15.3552

YEAR	1968				
SHA	100.	23.470541	28.613731	31.220579	16.695147
LAM	1.077047	1.042181	1.060453	1.087333	1.141132

YEAR 2008

AGE	TOTAL	N. EAST	N.CENTR.	SOUTH	WEST
0	56637644.	10185966.	15467552.	17897404.	13086720.
5	49840572.	9086648.	13573686.	15722121.	11458115.
10	44465276.	8158055.	12005971.	14104174.	10197074.
15	39715000.	7330544.	10584132.	12639876.	9160447.
20	35617448.	6713233.	9516544.	11189679.	8197990.
25	31942124.	6154932.	8584241.	9892798.	7310151.
30	28417214.	5528631.	7561051.	8802933.	6524597.
35	24980934.	4906927.	6569940.	7772151.	5731916.
40	21806282.	4357160.	5687751.	6791302.	4970069.
45	19501664.	4002786.	5078895.	6025156.	4394827.
50	16957292.	3500954.	4463241.	5216736.	3776361.
55	14663166.	2990057.	3840369.	4592575.	3240164.
60	11951889.	2431463.	3079152.	3836341.	2604934.
65	8592951.	1736529.	2195717.	2834613.	1826091.
70	6170391.	1235452.	1582181.	2044607.	1308151.
75	4667793.	948765.	1216270.	1530635.	972124.
80	3165336.	647206.	839643.	1035425.	643063.
85	2417785.	451318.	624312.	847877.	494278.
TOT	421510816.	80366640.	112470656.	132776416.	95897080.
M.AGE	27.2868	28.1719	26.9378	27.3534	26.8622

PERCENTAGE DISTRIBUTION

AGE	TOTAL	N. EAST	N.CENTR.	SOUTH	WEST
0	13.4368	12.6744	13.7525	13.4794	13.6466
5	11.8243	11.3065	12.0686	11.8410	11.9483
10	10.5490	10.1510	10.6748	10.6225	10.6334
15	9.4221	9.1214	9.4106	9.5197	9.5524
20	8.4499	8.3533	8.4614	8.4275	8.5487
25	7.5780	7.6586	7.6324	7.4507	7.6229
30	6.7418	6.8793	6.7227	6.6299	6.8037
35	5.9265	6.1057	5.8415	5.8536	5.9772
40	5.1734	5.4216	5.0571	5.1148	5.1827
45	4.6266	4.9807	4.5158	4.5378	4.5829
50	4.0230	4.3562	3.9684	3.9290	3.9379
55	3.4787	3.7205	3.4146	3.4589	3.3788
60	2.8355	3.0255	2.7377	2.8893	2.7164
65	2.0386	2.1608	1.9523	2.1349	1.9042
70	1.4639	1.5373	1.4067	1.5399	1.3641
75	1.1074	1.1805	1.0814	1.1528	1.0137
80	0.7510	0.8053	0.7465	0.7798	0.6706
85	0.5736	0.5616	0.5551	0.6386	0.5154

AGE	TOTAL	N. EAST	N.CENTR.	SOUTH	WEST
0	100.0000	17.9844	27.3097	31.5998	23.1060
5	100.0000	18.2314	27.2342	31.5448	22.9895
10	100.0000	18.3470	27.0008	31.7195	22.9327
15	100.0000	18.4579	26.6502	31.8265	23.0655
20	100.0000	18.8482	26.7188	31.4163	23.0168
25	100.0000	19.2690	26.8744	30.9710	22.8856
30	100.0000	19.4552	26.6073	30.9775	22.9600
35	100.0000	19.6427	26.2998	31.1123	22.9452
40	100.0000	19.9812	26.0831	31.1438	22.7919
45	100.0000	20.5254	26.0434	30.8956	22.5357
50	100.0000	20.6457	26.3205	30.7640	22.2698
55	100.0000	20.3916	26.1906	31.3205	22.0973
60	100.0000	20.3438	25.7629	32.0982	21.7952
65	100.0000	20.2088	25.5525	32.9877	21.2510
70	100.0000	20.0223	25.6415	33.1358	21.2005
75	100.0000	20.3258	26.0566	32.7914	20.8262
80	100.0000	20.4467	26.5262	32.7114	20.3158
85	100.0000	18.6666	25.8216	35.0684	20.4434

YEAR	2008				
SHA	100.	19.066330	26.682747	31.500122	22.750799
LAM	1.110937	1.089694	1.104932	1.108771	1.139908

STABLE EQUIVALENT TO ORIGINAL POPULATION
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AGE	TOTAL	N. EAST	N.CENTR.	SOUTH	WEST
0	18876454.	2599585.	4880129.	5798628.	5598112.
5	16619858.	2315030.	4282902.	5094970.	4926956.
10	14867724.	2070612.	3795298.	4573767.	4428046.
15	13289214.	1857107.	3349606.	4100727.	3981714.
20	11854160.	1706336.	3006115.	3627127.	3514583.
25	10560285.	1571279.	2699815.	3199555.	3089636.
30	9399512.	1420982.	2380203.	2845424.	2752904.
35	8347627.	1272992.	2094037.	2527517.	2453081.
40	7372790.	1128875.	1835854.	2231160.	2176901.
45	6451581.	988275.	1598141.	1950937.	1914228.
50	5569405.	849825.	1373449.	1685750.	1660380.
55	4715413.	712431.	1156516.	1433887.	1412560.
60	3878041.	574691.	942565.	1191029.	1169755.
65	3061679.	441550.	736511.	952515.	931102.
70	2264398.	316996.	541570.	711593.	694239.
75	1499182.	202756.	358444.	474572.	463410.
80	859469.	110884.	204642.	274930.	269013.
85	574679.	65387.	130671.	195474.	183146.
TOT	140061472.	20205594.	35366524.	42869560.	41619788.
M.AGE	27.1296	27.5941	26.7110	27.1483	27.2405

PERCENTAGE DISTRIBUTION

AGE	TOTAL	N. EAST	N.CENTR.	SOUTH	WEST
0	13.4773	12.8657	13.7987	13.5262	13.4506
5	11.8661	11.4574	12.1100	11.8848	11.8380
10	10.6151	10.2477	10.7313	10.6690	10.6393
15	9.4881	9.1911	9.4713	9.5656	9.5669
20	8.4635	8.4449	8.4999	8.4608	8.4445
25	7.5398	7.7765	7.6338	7.4635	7.4235
30	6.7110	7.0326	6.7301	6.6374	6.6144
35	5.9600	6.3002	5.9210	5.8958	5.8940
40	5.2640	5.5869	5.1909	5.2045	5.2304
45	4.6062	4.8911	4.5188	4.5509	4.5993
50	3.9764	4.2059	3.8835	3.9323	3.9894
55	3.3667	3.5259	3.2701	3.3448	3.3940
60	2.7688	2.8442	2.6651	2.7783	2.8106
65	2.1860	2.1853	2.0825	2.2219	2.2372
70	1.6167	1.5689	1.5313	1.6599	1.6681
75	1.0704	1.0035	1.0135	1.1070	1.1134
80	0.6136	0.5488	0.5786	0.6413	0.6464
85	0.4103	0.3236	0.3695	0.4560	0.4400

AGE	TOTAL	N. EAST	N.CENTR.	SOUTH	WEST
0	100.0000	13.7716	25.8530	30.7188	29.6566
5	100.0000	13.9293	25.7698	30.6559	29.6450
10	100.0000	13.9269	25.5271	30.7631	29.7829
15	100.0000	13.9745	25.2059	30.8576	29.9620
20	100.0000	14.3944	25.3592	30.5979	29.6485
25	100.0000	14.8791	25.5657	30.2980	29.2571
30	100.0000	15.1176	25.3226	30.2720	29.2877
35	100.0000	15.2497	25.0854	30.2783	29.3866
40	100.0000	15.3114	24.9004	30.2621	29.5261
45	100.0000	15.3183	24.7713	30.2397	29.6707
50	100.0000	15.2588	24.6606	30.2680	29.8125
55	100.0000	15.1086	24.5263	30.4085	29.9566
60	100.0000	14.8191	24.3052	30.7121	30.1636
65	100.0000	14.4218	24.0558	31.1109	30.4115
70	100.0000	13.9991	23.9167	31.4252	30.6589
75	100.0000	13.5244	23.9093	31.6554	30.9109
80	100.0000	12.9015	23.8103	31.9883	31.2999
85	100.0000	11.3780	22.7382	34.0146	31.8693

YEAR	2418				
SHA	100.	14.426233	25.250715	30.607674	29.715372
LAM	1.115217	1.115154	1.115218	1.115212	1.115252

PARAMETERS OF STABLE POPULATION

********************************** DISCRETE MODEL

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	AGGREGATED	N. EAST	N.CENTR.	SOUTH	WEST
S. EQUIV. (Y)	140061472.	20205594.	35366524.	42869560.	41619788.
SHARE (SHA)	1.00000	0.14426	0.25251	0.30608	0.29715
Q	4052004.	553205.	1047346.	1247996.	1203457.
LAMBDA (λ)	1.115217				
INTRINSIC RATES					
GROWTH (r)	0.021810				
BIRTH (b)	0.028930	0.027379	0.029614	0.029111	0.028916
DEATH (d)	0.007120	0.007138	0.006572	0.007625	0.007058
DELTA (Δ)		0.005569	0.007804	0.007302	0.007106
OUTMIG. (o)		0.008528	0.010823	0.009785	0.008993
INMIG. (ι)		0.010097	0.009591	0.010108	0.008945
NET MIG. (n)		0.001569	-0.001232	0.000323	-0.000048