

# **Migration and Settlement: 3. Sweden**

**Andersson, A.E. and Holmberg, I.**

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**MIGRATION AND SETTLEMENT:  
3. SWEDEN**

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## FOREWORD

Interest in human settlement systems and policies has been a central part of urban-related work at the International Institute for Applied Systems Analysis (IIASA) from the outset. From 1975 through 1978 this interest was manifested in the work of the Migration and Settlement Task, which was formally concluded in November 1978. Since then, attention has turned to dissemination of the Task's results and to the conclusion of its comparative study, which, under the leadership of Dr. Frans Willekens, is focusing on a comparative quantitative assessment of recent migration patterns and spatial population dynamics in all of IIASA's 17 National Member Organization countries.

The comparative analysis of national patterns of interregional migration and spatial population growth is being carried out by an international network of scholars who are using methodology and computer programs developed at IIASA.

This report reviews recent multiregional population changes in Sweden. Professor Åke Andersson of the University of Umeå, Sweden, on leave at IIASA, and Associate Professor Ingvar Holmberg, of the University of Gothenburg, analyze the demographic components of spatial population change and evaluate the effects of population distribution policies implemented over the past decades.

Reports summarizing previous work on migration and settlement at IIASA are listed at the end of this report.

*Andrei Rogers*  
Chairman  
Human Settlements  
and Services Area



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## 1 INTRODUCTION

### *1.1 Purpose and Background*

This report is part of the Comparative Migration and Settlement Study included in the Migration and Settlement Task in the Human Settlements and Services Area at the International Institute for Applied Systems Analysis (IIASA). The purpose of this report is to give a detailed overview of the internal migration patterns and regional policies in Sweden. As similar studies are being carried out in all the member countries of IIASA, a basis is being laid for comparing migration patterns.

Since the technique of multiregional population analysis is employed in the calculations, an additional by-product of the study is an evaluation of this method and its usefulness as a tool for policy makers in the study of human settlement systems and for regional population forecasts.

Sweden has detailed population data dating from the middle of the eighteenth century. In 1748 an organization for the collection and tabulation of population statistics was established which has made it possible to study population development and its components over a long time perspective.

In the 1970s Sweden had a program for collecting vital statistics and other population data which allowed excellent opportunities for evaluating new techniques of population analysis. This program has few counterparts in other countries with respect to its completeness, coverage, and exactness.

This report is organized as follows. Sections 1.2 and 1.3 discuss the administrative subdivisions of Sweden and the organization of the population statistics, respectively. Section 1.4 describes the settlement pattern of Sweden in a historical perspective. Chapter 2 deals with current patterns of spatial population growth and of its components (fertility, mortality, and migration). The problem of regional aggregation is also discussed, to some extent, and various regional

systems are proposed. In Chapter 3 the results of the multiregional population analysis are presented: life tables, population projections, and fertility and migration analysis. Chapter 4 presents an outline of population policies in Sweden, with special emphasis on the regional labor market and internal migration policies.

### *1.2 The Administrative Subdivisions of Sweden*

The basic unit in the population registration system of Sweden is the parish. This can be subdivided into one or more districts. For administrative purposes the basic unit is a municipality (kommun), and with approximately 2,570 parishes and 278 municipalities there are, on average, 9 or 10 parishes in each municipality. The municipalities may be further aggregated into 70 A-regions – as they are known – or to 24 counties (Figures 1.1 and 1.2).

The A-regions were introduced, as part of the labor market policy organization, at the end of the 1950s. They are defined, for the purpose of labor and service administration, as “commuting regions.” When presenting population, economic, or other statistics the counties are often aggregated into county regions, of which there are eight. The boundaries of these county regions are shown in Figure 1.1.

The population density of the A-regions varies greatly between different parts of the country. For this reason most of the northern A-regions are not really commuting regions but rather public service areas and labor-market planning regions. The importance of this distinction is shown in Table 1.1.

The parish is the basic unit in the population registration system and it may also be used as a basic unit in demographic analysis. However, such a large number of regions cannot be handled for most practical purposes. The regional system actually used depends on the purpose of the study. In the historical outline of Swedish population growth the county regions have been used, mainly because these regions give an acceptably accurate picture of the population development in various parts of the country. More recent development trends are also illustrated by the A-regions. Other regional systems are discussed in section 2.1 and may be regarded as special-purpose regions.

### *1.3 Organization of Swedish Population Statistics*

According to Swedish law everyone who permanently lives in Sweden should be registered in one of the parishes of the country. The parish registers are kept by the clergy and a register is also kept at each of the 24 counties in the country.

With only a few exceptions all vital events, such as births, deaths, changes in marital status, and external and internal migratory moves, are reported to the parish and by the parish to the County Board. Any changes are sent weekly to the County Board where the information is used for updating the Register of the Total Population (RTB) which is kept at the Central Bureau of Statistics in Örebro.

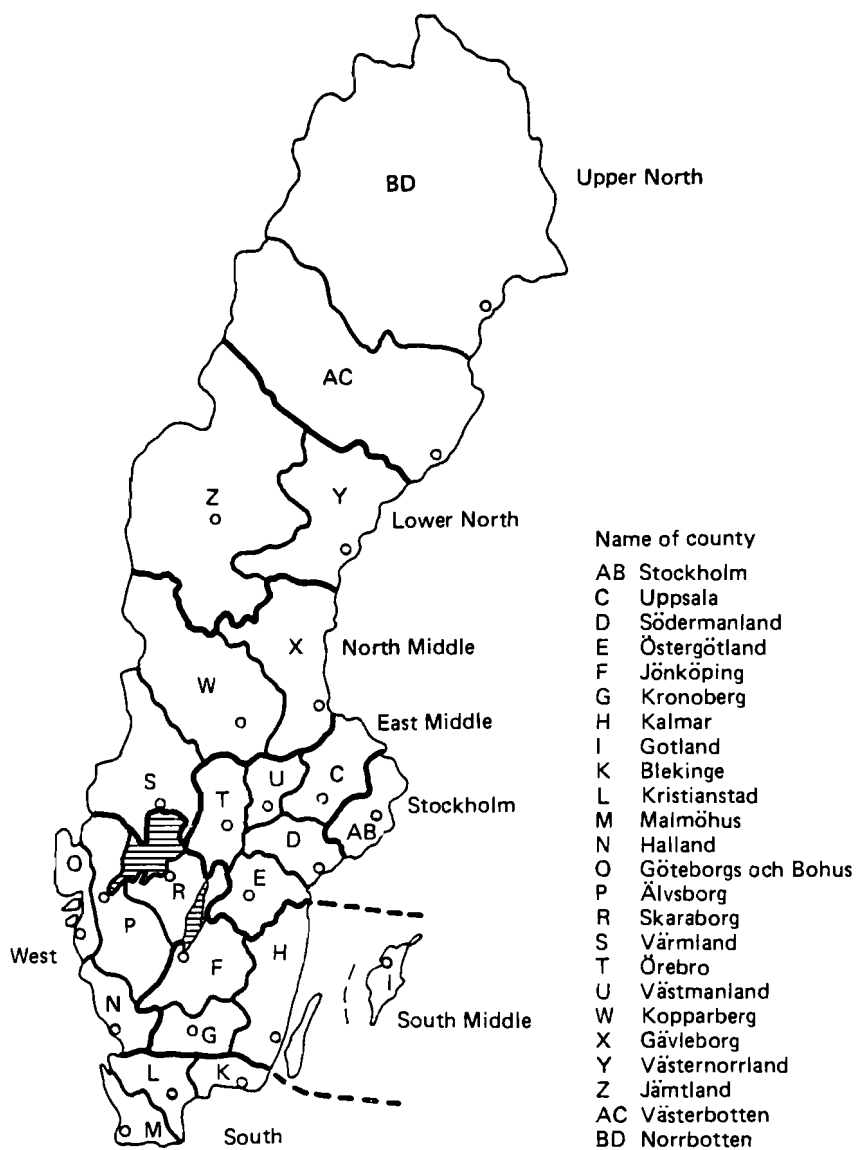


FIGURE 1.1 Counties and county regions. Source: Central Bureau of Statistics.

- 01 Stockholm/Södertälje
- 02 Norrtälje, 03 Enköping
- 04 Uppsala, 05 Nyköping
- 06 Katrineholm, 07 Eskilstuna
- 08 Mjölby/Motala
- 09 Linköping, 10 Norrköping
- 11 Jönköping, 12 Tranås
- 13 Eksjö/Nässjö/Vetlanda
- 14 Värnamo, 15 Ljungby
- 16 Växjö, 17 Västervik
- 18 Hultsfred/Vimmerby
- 19 Oskarshamn
- 20 Kalmar/Nybro
- 21 Visby, 22 Karlskrona
- 23 Karlshamn, 24 Kristianstad
- 25 Hässleholm, 26 Ängelholm
- 27 Helsingborg/Landskrona
- 28 Malmö/Lund/Trelleborg
- 29 Ystad/Simrishamn
- 30 Eslöv, 31 Halmstad
- 32 Falkenberg/Varberg
- 33 Göteborg/Alingsås
- 34 Uddevalla
- 35 Trollhättan/Vänersborg
- 36 Borås
- 37 Lidköping/Skara
- 38 Falköping, 39 Skövde
- 40 Mariestad
- 41 Kristinehamn/Filipstad
- 42 Karlstad
- 43 Säffle/Åmål
- 44 Arvika, 45 Örebro
- 46 Karlskoga
- 47 Lindesberg
- 48 Västerås, 49 Köping
- 50 Fagersta, 51 Sala
- 52 Borlänge/Falun
- 53 Avesta/Hedemora
- 54 Ludvika, 55 Mora
- 56 Gävle/Sandviken
- 57 Bollnäs/Söderhamn
- 58 Hudiksvall/Ljusdal
- 59 Sundsvall
- 60 Härnösand/Kramfors
- 61 Sollefteå
- 62 Örnköldsvik
- 63 Östersund
- 64 Umeå
- 65 Skellefteå
- 66 Lycksele
- 67 Piteå
- 68 Luleå/Boden
- 69 Haparanda/Kalix
- 70 Kiruna/Gällivare

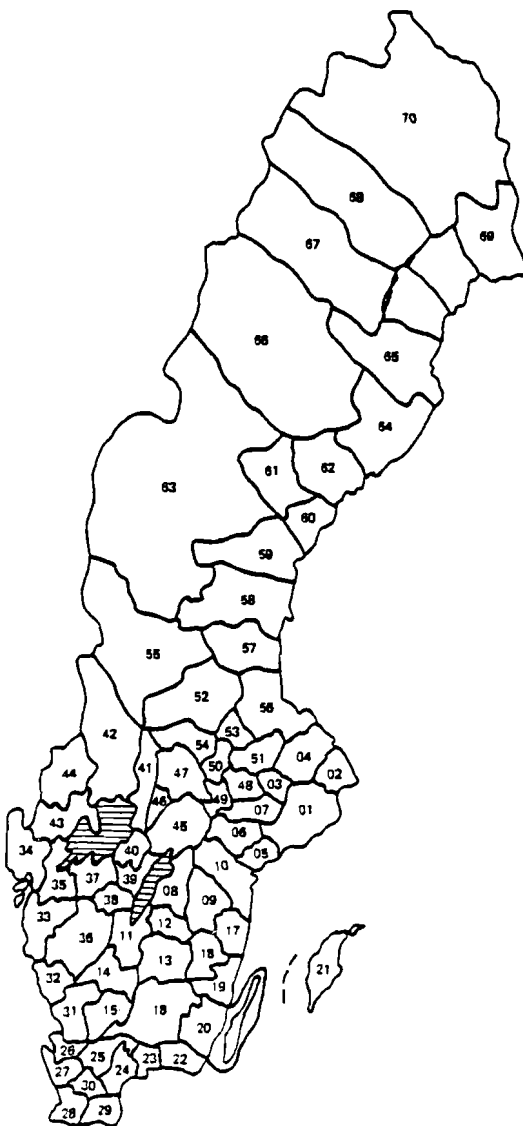


FIGURE 1.2 A-regions. Source: Labor Market Board.

TABLE 1.1 Average area and population of A-regions belonging to different county regions in Sweden (1974).

County region	Population	Area in 1,000 km <sup>2</sup>
Stockholm	744,572	3,247
East Middle	99,940	2,745
South Middle	69,565	2,974
South	129,203	1,541
West	160,788	2,989
North Middle	71,283	5,344
Lower North	80,130	14,326
Upper North	70,918	22,048

SOURCE: Folk- och bostadsräkningen 1975. Del 3.2 (Population Census 1975. Part 3.2).

NOTE: The A-region boundaries do not coincide exactly with the boundaries of county regions, which causes a minor error in the figures.

In order to have a civil registration system where all increases and decreases balance at zero a special register called the Residence Unknown Register has been introduced. Until 1967 all persons whose place of residence was unknown at two successive annual registration controls were transferred to this register. In 1968 the procedure was changed slightly and foreign citizens who cannot be assumed to live in Sweden anymore and Swedish citizens who at two successive annual registrations have a permanent residence abroad are recorded as emigrants. In most cases transfers from the Residence Unknown Register concern persons who have returned to Sweden but who never reported their original emigration.

When regional comparisons of demographic characteristics are made it is important to know the principles behind the registration of vital events. New-born children are registered in the parish where the mother was registered at the time of delivery. The only exceptions to this are children born to women in the Residence Unknown Register or to foreigners who are not registered in the country at all. In the latter cases the birth will be registered in the parish where the delivery takes place. Deaths are recorded in the parish where the deceased was registered or, if not registered at all, in the parish where death took place or the corpse was found.

In population statistics migrations are defined as moves across parish borders. The time of migration is defined as the week when the move is recorded at the County Board. In the case of an internal migration over a county border the move is recorded both in the county of origin and in the county of destination, and the time of the move refers to week of registration in the county of origin.

It is important to know something about the effect of the "cut-off week".\*

\*The sixteenth week of the year.

TABLE 1.2 Registrations of vital events by year of occurrence (1976).

Year of occurrence	Births	Deaths
1975	79	30
1974	75	17
1973	44	6
1972	38	7
1971	26	4
1966–1970	75	5
1961–1966	16	3
–1960	–	2
<b>Total</b>	<b>53</b>	<b>75</b>

SOURCE: Befolkningsförändringar 1976. Del 3 (Population Changes. Part 3).

Since all vital statistics are based on announcements from the parish, a certain time lag appears in the registration of changes. The present procedure includes all information up to the sixteenth week, of the year following the statistical year. The general population “cut-off week” is the fourth week following the end of the statistical year. Because of this a certain, but small, discrepancy exists with respect to population and vital events reported for any given year.

Table 1.2 gives an idea of the size of this error. The total number of births amounts to 353. If the distribution over a year of occurrence is reasonably stable the total error in the birth statistics could be estimated at approximately 3.6 per thousand. For the more recent years of occurrence it is probably a question of the delay in reporting events that causes the error. For earlier years of occurrence it may have been caused by parents returning to their home country and reporting births that took place abroad. By the same assumption the error in the death statistics could be estimated at less than 1 per thousand. In this case some of the oldest registrations are official declarations of death for persons who have disappeared.

There is also a slight error in the total population reported at the end of the year. As an earlier “cut-off week” is employed in population statistics than in statistics of vital events there is a small deviation between the difference in populations at the end and the beginning of the year, and the total number of changes reported for the same year.

An extensive check of the civil registration was carried out in 1972 when Sweden changed to a new system for car registration. Car registration cards were sent to all persons of ages 15–90. In all cases of nondelivery the reasons were investigated by the parish authorities. The total number of undeliverable cards was 64,700. The causes are summarized in Table 1.3.

TABLE 1.3 Results of the civil registration system check (1972).

Undeliverable register cards <sup>a</sup>	Cause of nondelivery
64,700 (1.1)	Total number of undeliverable register cards
18,500 (0.3)	Move reported before investigation
12,400 (0.2)	No measures taken
9,000	incomplete address
1,200	deceased
2,200	temporarily absent
3,600 (0.1)	Not living at given address but should be recorded in the parish register (e.g., hospitalized for long-term care)
24,300 (0.4)	Migrated without notifying authorities
16,000	migrated within the country
3,300	migrated to other Nordic country
5,100	migrated to non-Nordic country
5,900 (0.1)	Residence unknown
2,200	citizen of other Nordic country
1,000	citizen of non-Nordic country
2,700	other

<sup>a</sup>Figures within parentheses are percentages of the total population aged 15–90 years.  
SOURCE: Befolkningsförändringar 1973. Del 3 (Population Changes 1973. Part 3).

Depending on the definition there is a total maximum error of 0.4 percent and a minimum error of 0.1 percent in the population figures for ages 15–90.

#### 1.4 The Historical Settlement Pattern of Sweden 1750–1975

The Swedish population distribution is available since the beginning of the eighteenth century. Population data from 1750 have been aggregated into the 8 county regions and are illustrated in Figure 1.3.

On the basis of Figure 1.3 the following observations about the settlement pattern in Sweden can be made:

- the Stockholm region has been increasing its relative share of the total population at a steady rate from 1850 to 1970. This was broken by a period of stagnation beginning in about 1970
- the counties of the periphery (Upper and Lower North) have also shown an increase. From a share of approximately 5 percent around 1750, they increased to 8 percent around 1850 and had a peak of

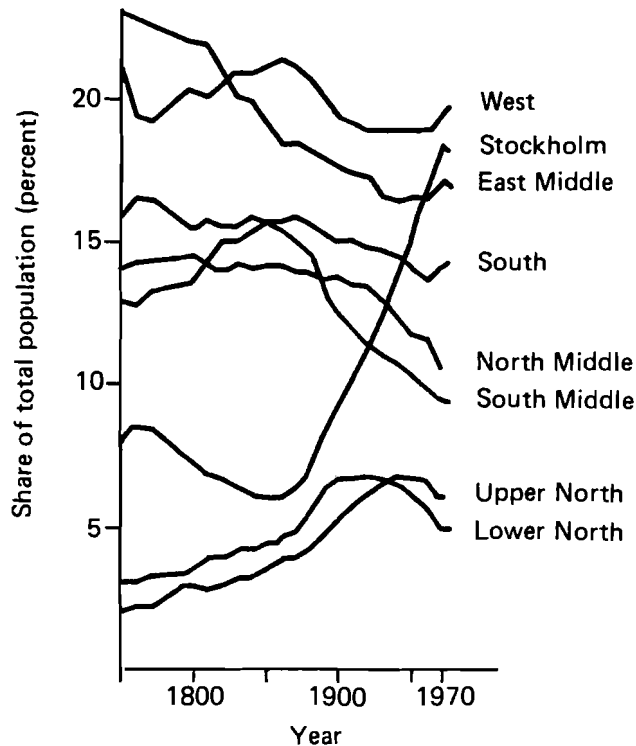


FIGURE 1.3 Population distribution in Sweden 1750–1974. Source: 1750–1950 *Historisk Statistik I. Befolkning* (Historical Statistics I. Population); 1951–1960 *Befolkningsrörelsen* (Population Changes); 1961–1966 *Folkmängdens förändringar* (Population Changes); 1967–1974 *Befolkningsförändringar. Del 3* (Population Changes. Part 3).

approximately 13 percent in 1950. Since then their relative share has decreased and in 1970 it was slightly less than 11 percent of Sweden's total population

- the most stable parts of the country are the southern and the western regions which have had approximately 14 and 19 percent of the total population, respectively, for the time period illustrated
- all the counties of the eastern and mid-inland parts of the country (South Middle, East Middle, and North Middle) have declined in relative economic and demographic importance. These areas had around 53 percent of the total population in 1750, a figure that had decreased to 44 percent by 1900 and to 37 percent by 1970

The long-term migration movement appears to be from the inland to the coastal areas, with some concentration in the metropolitan region of Stockholm. In a historical perspective there has been no real increase in the relative population shares of the Gothenburg and Malmö metropolitan regions. The development



of the settlement pattern has been accompanied by significant changes in population densities and in the regional income distribution. The development of the population density in the county regions is given in Figure 1.4 and the change in income shares for the period 1920–1975 is shown in Figure 1.5.

Changes in the settlement pattern cannot be illustrated only with statistics for macro regions, of the kind used in the study. Large pattern changes can only be recorded at lower levels of aggregation. This is particularly the case for development after 1950, when the great revolution in transportation and communication technology occurred. The introduction of mopeds, motorcycles, and cars as private means of transportation and the expansion of the telephone, television, and other electronic networks have made it less important to have a central location in the public transportation networks.

To illustrate these changes two main levels of geographical aggregation are relevant – the labor-market regions and the urban/rural regions. The first is related to the A-regions mentioned previously. Their average population is 120,000 but variation in size is large and follows the well-known rank–size rule fairly accurately. The development of the rank–size rule for these A-regions is shown in Figure 1.6 for the period 1965–1975.

It has been argued that regional differences in population growth have become less pronounced. This implies an equalization of the regional distribution of the country's population. This means that for rank–size distribution the curve should be displaced upward, showing a slower descent. Figure 1.6 shows that this is not true and that, in fact, the descent has become much steeper, implying an even more pronounced inequality of population distribution. The changes in the ranks over the 10-year period are, in most cases, almost insignificant. There are a few exceptions, however, pertaining to either growing A-regions near to the three metropolitan regions, e.g., Nyköping, Ängelholm, and Enköping (Figure 1.6), or declining A-regions in sparsely populated areas, such as Lycksele which has dropped from rank 49 to rank 58. Although the rank–size rule has been regarded with great suspicion by many scholars, it is interesting to note how well this rule describes the regional distribution of the population in Sweden. It also indicates that the suggestion that the population distribution in Sweden has become more even during recent years is not well founded.

A characteristic problem observed in most industrialized countries is the great exodus of people from rural to urban areas. Although statistics are scarce for earlier periods it is possible to study the development of the urban population from the beginning of the nineteenth century, and some rough estimates can be made back to the mid-eighteenth century. Even today large areas in Sweden are very sparsely populated. An important change in nineteenth-century Sweden was the population increase in the more peripheral areas. The colonization of large parts of northern Sweden played an important part in this population redistribution. From 1880 onward the population increase became more and more concentrated around certain growth poles, where the population increased more rapidly than it did for the country as a whole.

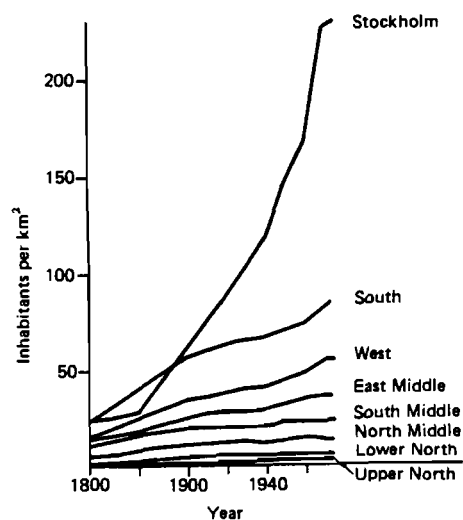


FIGURE 1.4 Density of population in the county regions. Source: Population: see Figure 1.3. Area: 1880–1950 Folkräkningen (Population Census); 1960–1975 Statistisk Årsbok (Statistical Abstract of Sweden).

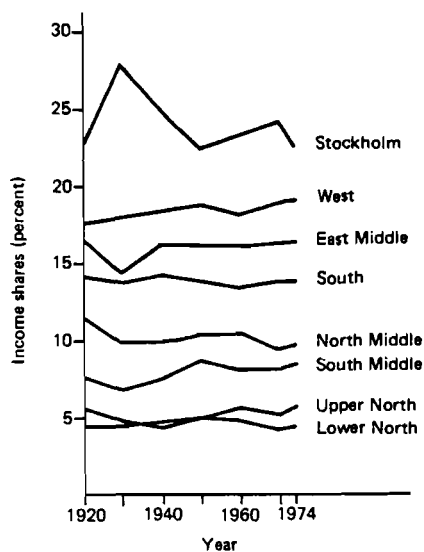


FIGURE 1.5 Income shares for regions as a percentage of the total income of Sweden. Source: Skattetaxeringarna 1922–1971 (Income assessment); Taxeringsutfallet 1975. Statistiska meddelanden N 1975:92 (Tax assessment 1975. Statistical Reports).

NOTE: In Sweden this concept of income is defined as total personal income less deductions for deficit in income source and other general deductions.

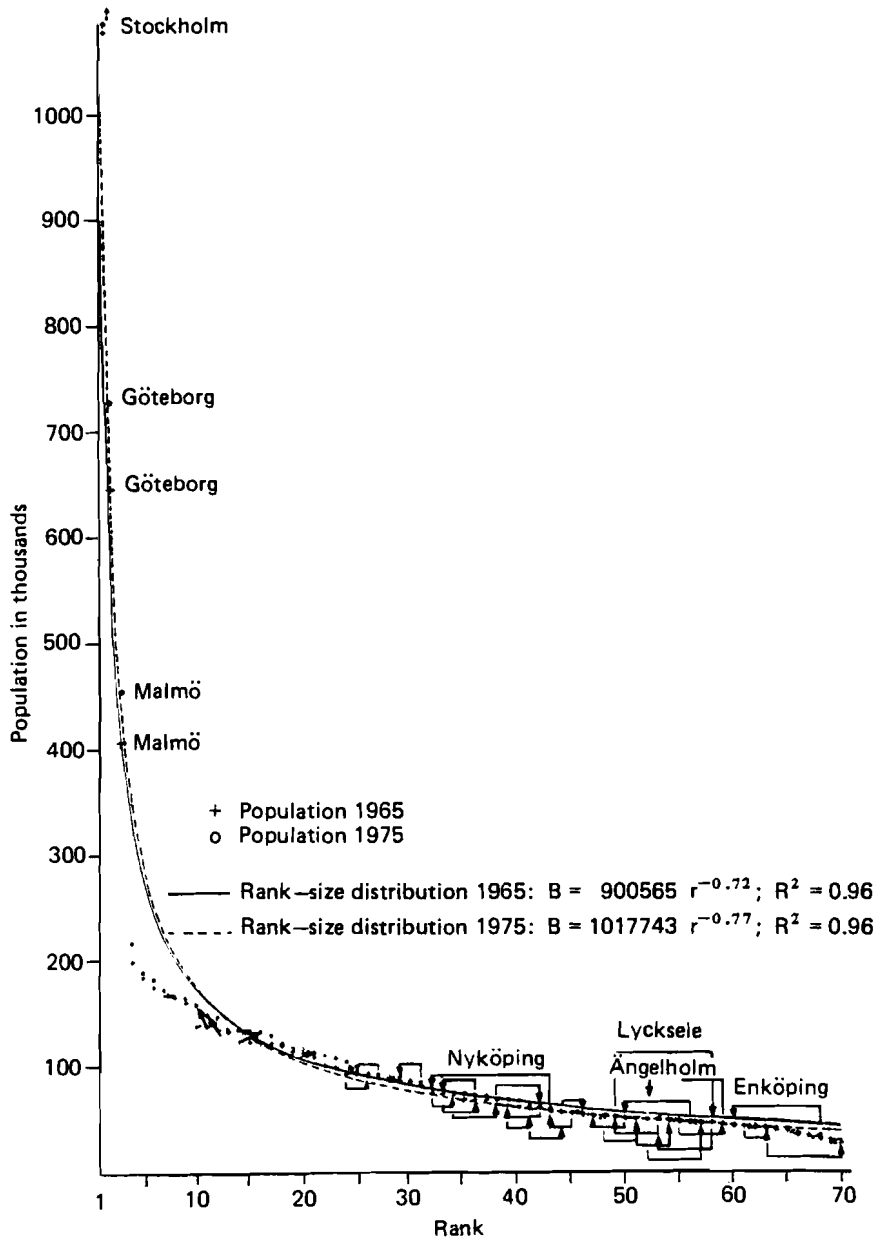


FIGURE 1.6 Rank-size distribution of Swedish A-regions. Source: Calculated from raw data. 1965 Folk- och bostadsräkningen. Del 3 (Population Census. Part 3); 1975 Folkmängd. Del 3 (Population Census. Part 3).

TABLE 1.4 Number of localities by size of population; 1950, 1960, 1970, and 1975.

Size of population	Number of localities				Index <sup>a</sup>
	1950	1960	1970	1975	
200–499	1,076	883	756	700	65
500–1,999	711	624	638	674	95
2,000–4,999	153	161	208	214	140
5,000–9,999	51	70	66	90	176
10,000–19,999	37	37	58	58	157
20,000–49,999	18	26	32	33	183
50,000–99,999	7	10	14	13	186
100,000 +	3	3	3	4	133
Total	2,056	1,814	1,775	1,786	87

<sup>a</sup>Number of localities in 1975 as a percentage of the number in 1950.

The major reason for this localized growth is the emergence of cities. For the mid-eighteenth century the total urban population has been estimated at approximately 9 percent of the total population. In 1880, when actual data are available for the first time, the urban share of the total population had not reached 10 percent. It was not until the middle of the nineteenth century that the urban share of the total population exceeded 10 percent. From then the urban population increased at a growing rate. At the end of the nineteenth century the share had doubled and in the 1970s approximately 80 percent of the population lived in “localities,” especially around Stockholm and along the west coast.

Localities are here defined as agglomerations with more than 200 persons in a contiguous location. Contiguity implies that no people who live more than 200 m from their nearest neighbor are included in the locality. Some exceptions to this rule can be seen, especially in the larger localities where interactions have been observed to operate over distances larger than 200 m. When a large proportion of the population lives in localities it is implied that the internal size distribution of population localities is of importance. The evolution of the relative importance of localities of different size is shown in Table 1.4.

The number of localities with less than 2,000 inhabitants has decreased. The most striking decrease has been in the smallest size group. All the size classes above and including 2,000 inhabitants have increased rather rapidly, with a peak in the increase of the localities of 50,000–100,000 inhabitants. In addition to this, an important concentration of the population in certain regions has become evident, (see Figure 1.7). The natural increase has shown large regional variations, but it is primarily internal migration that has contributed to the more rapid growth of certain regions.

Parallel with the redistribution of population and the urbanization of the

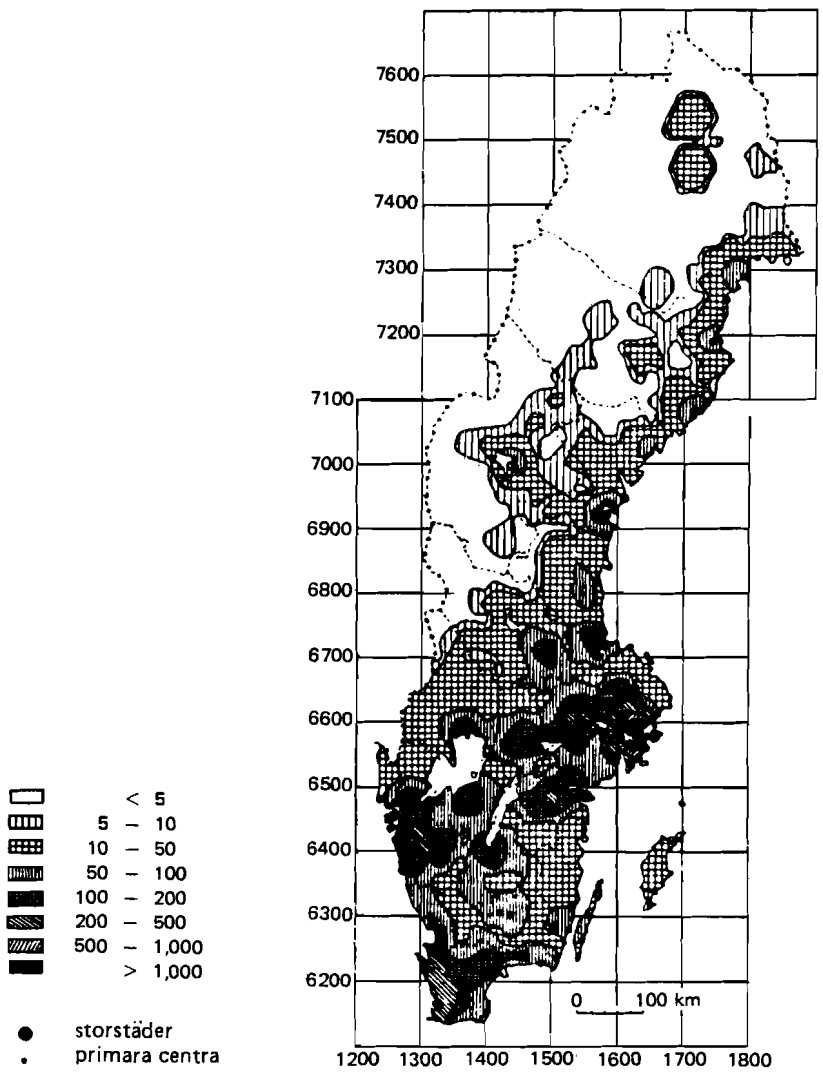


FIGURE 1.7 Local population in 1975 (in thousands). Source: Studies in Regional Policy (in Swedish) Labor Market Department, Ds A 1975:12.

NOTE: Local population is defined as the number of people within circles of radius 30 km centered on 1,200 nodes that are spread evenly over the country.

country, a restructuring of the population has taken place with respect to social class and occupation. The agricultural population, which for a long time was completely dominant, reached its maximum size in about 1880, when it amounted to approximately 3 million. Since then a continuous decline has taken place and the agricultural proportion of the population was only about 5 percent in the 1970s. In 1940 the population working in manufacturing industries had become the largest population group in the country, accounting for 38 percent of the total population. This proportion is now decreasing and the population in the service sector is the most rapidly increasing part of the working population.

The historical regional population and economic development has been extensively analyzed in several official and semi-official reports in the SOU\* and ERU\*\* series mentioned in the list of references.

## 2 CURRENT PATTERNS OF SPATIAL POPULATION GROWTH

### 2.1 *Regional Population Development*

Data on components of regional population development are only available to a limited extent. This is due to the organization of the population statistics. Age-distribution data on births and deaths, as well as total net internal and total external migration, are given for each year over the last 25-year period on a regional basis. Corresponding population data, however, are only given at the population censuses. Since the revision of population statistics in 1967 population data with regional disaggregations have become available. As a consequence, the presentation of components of regional population change often has to be based on crude rates although more detailed calculations, centered around the census years, may give a fairly representative view of the development.

Figure 2.1 shows the contribution of various components to total regional population growth. The rapid urbanization of the 1950s and 1960s is represented by the growth of the metropolitan regions (Stockholm, South, and West). When seen in this perspective Lower North seems to be the most problematic region, showing an almost constant decrease in population. The out-migration from this region is not compensated for by a natural increase or net external migration surplus as is the case for the Upper North region. In the latter region natural increase is larger than the net internal out-migration up to 1961 when the region experienced a population loss for a few years. The same observations can be made for the North Middle region. In the South Middle region a balance exists between natural increase and net internal migration losses. When a region shows a more rapid increase in the 1960s this is mainly due to net external migration gains at that time.

The general trend in regional population development was broken in the

\*SOU – Statens Offentliga Utredningar.

\*\*ERU – Expertgruppen för Regional Utredningsverksamhet.

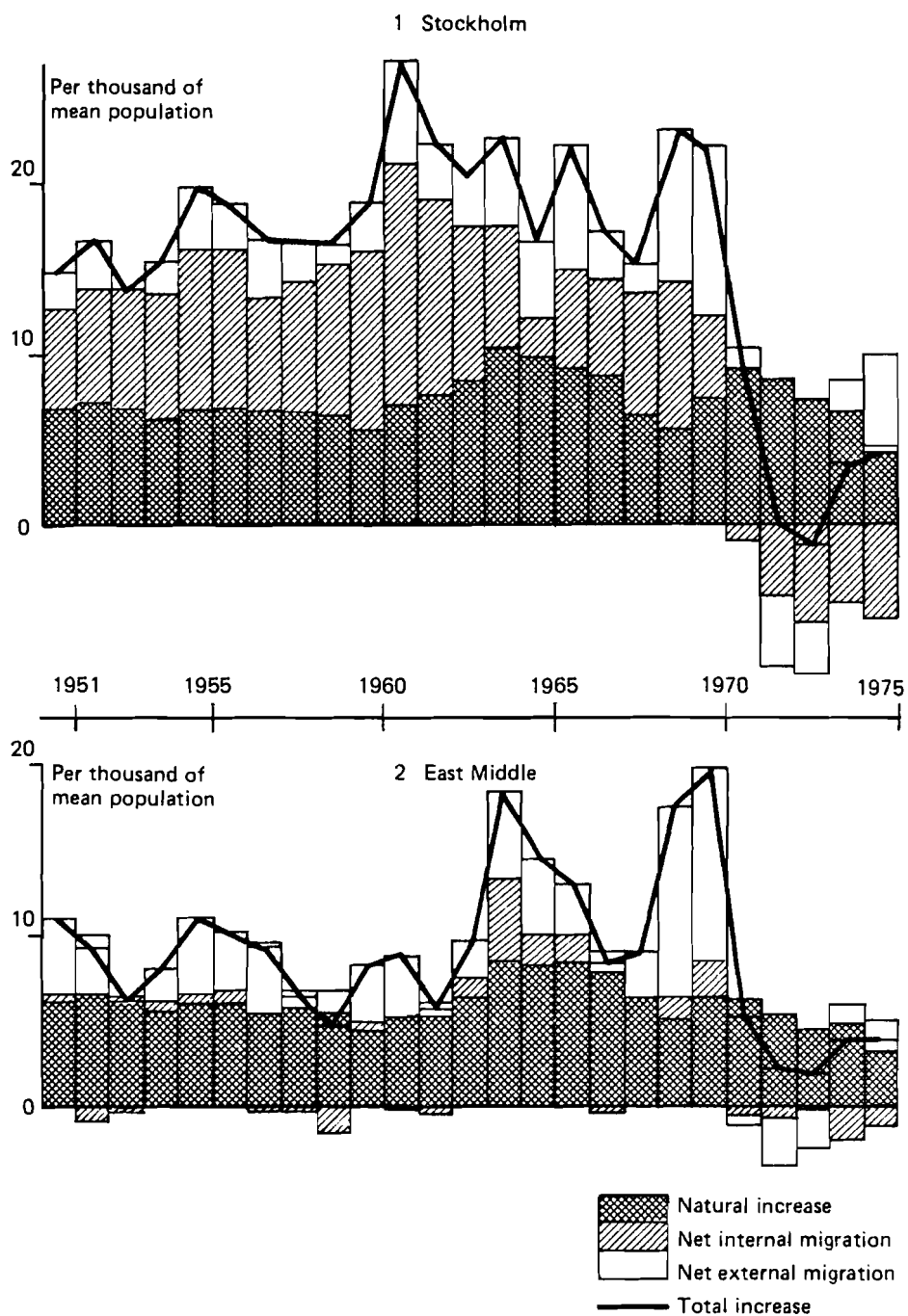


FIGURE 2.1 Components in regional population growth, 1951–1975.

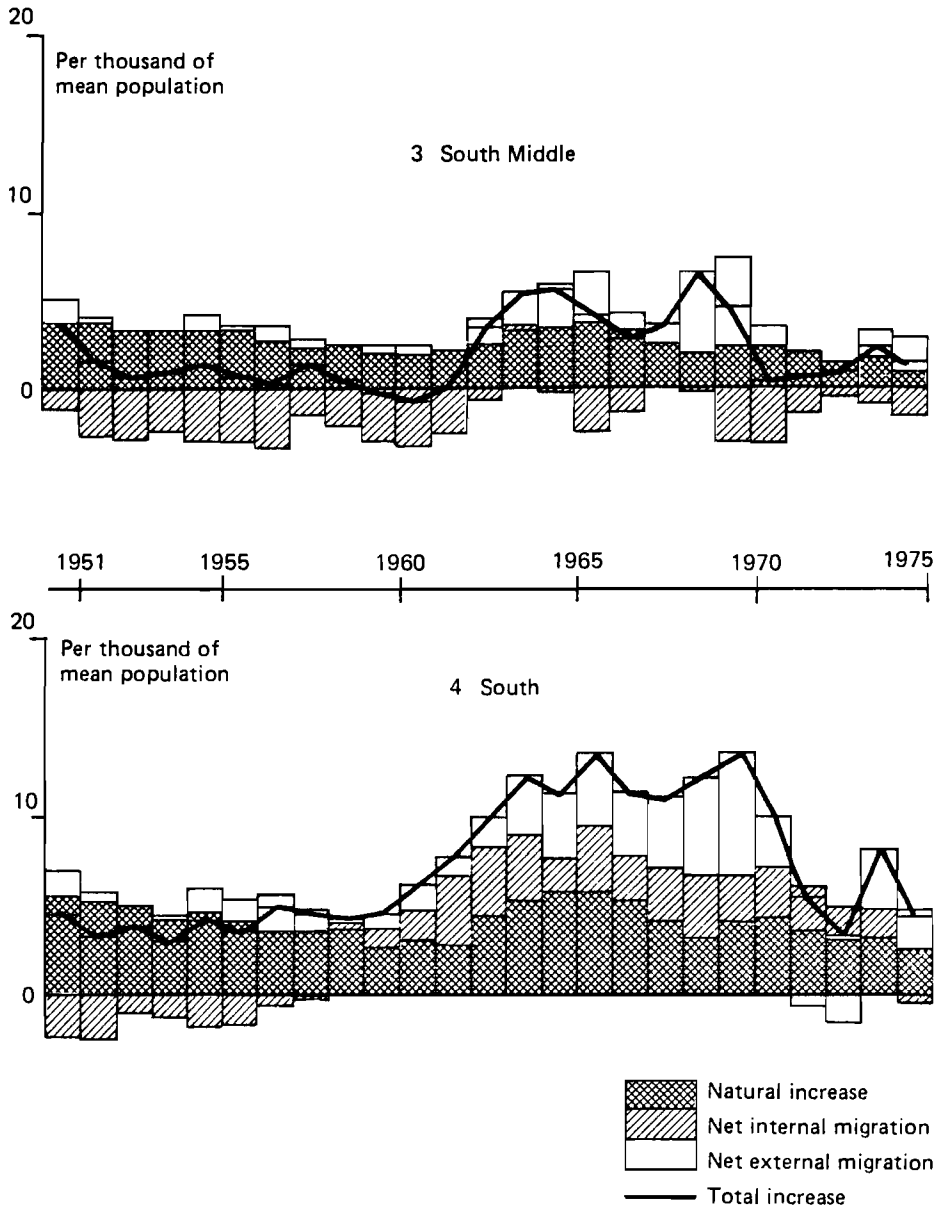
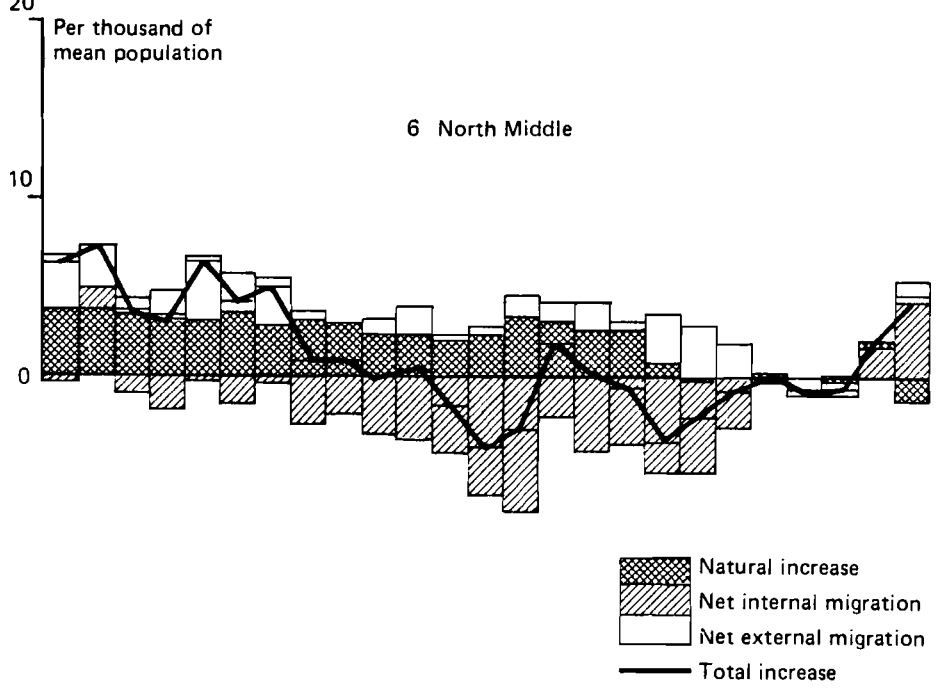
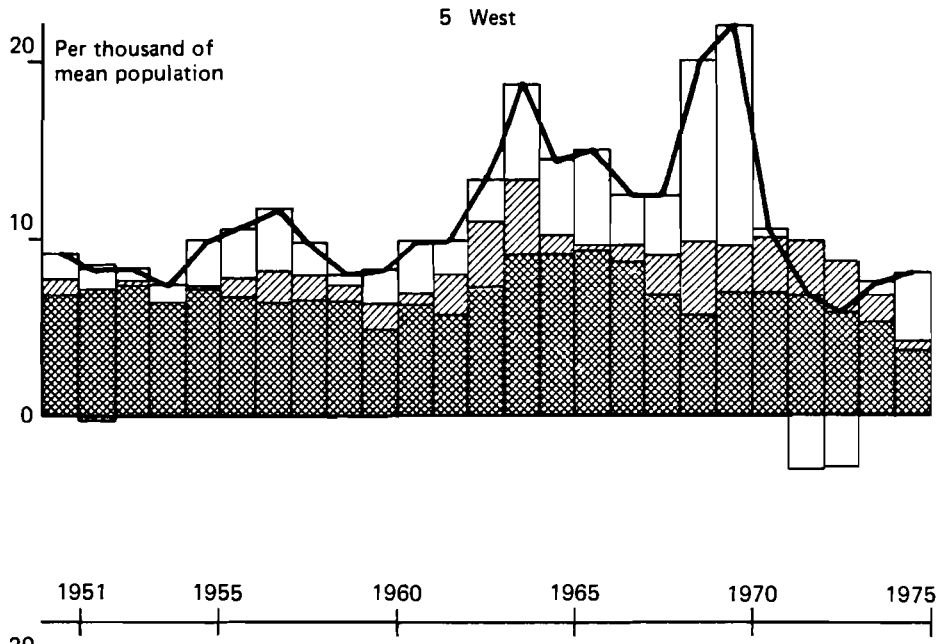


FIGURE 2.1 *Continued.*





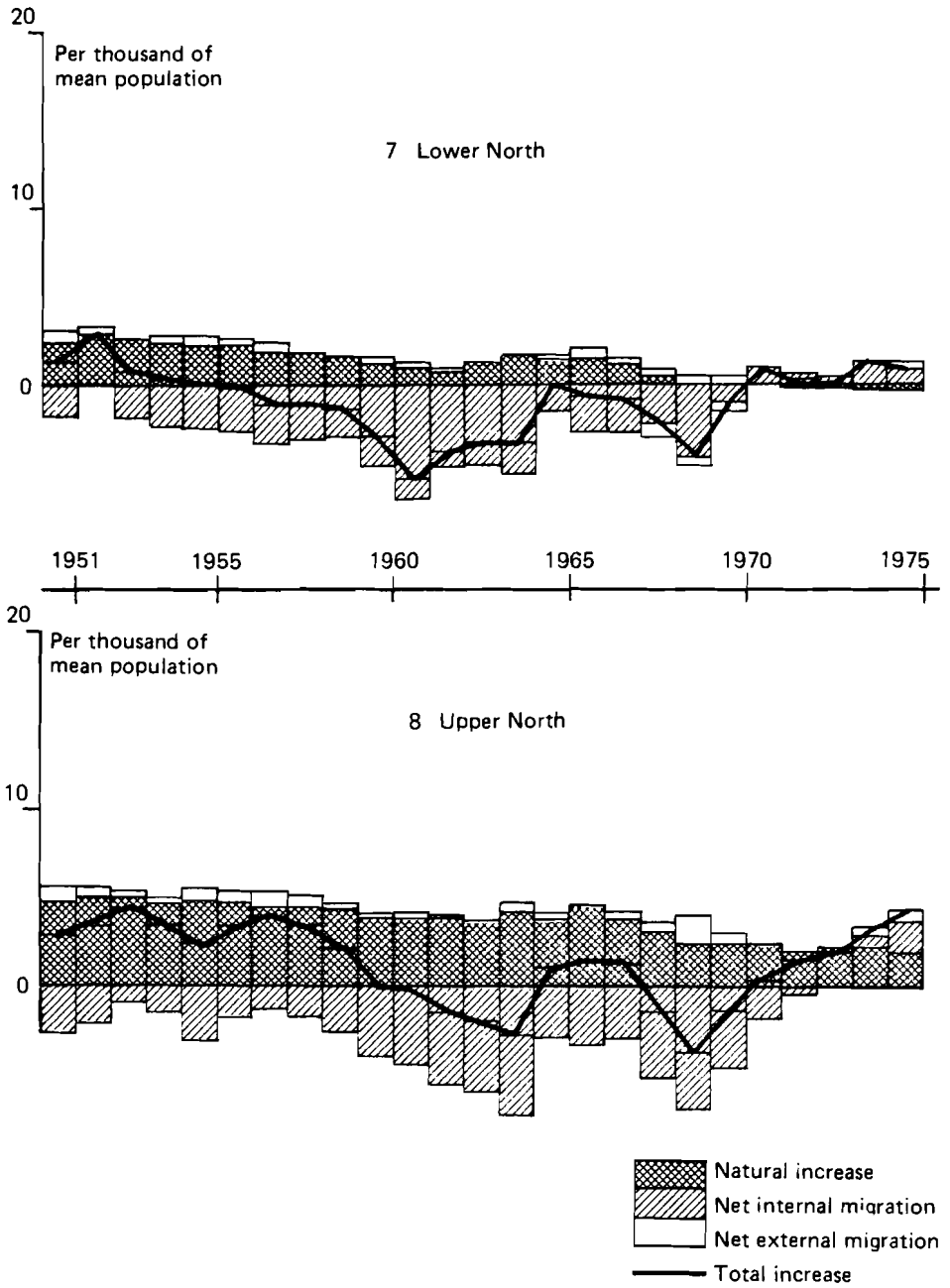


FIGURE 2.1 Continued.

1970s when the growth of the metropolitan regions began to lose momentum. For Stockholm this meant a net loss of population in 1973 of approximately 1,300. This change in growth pattern is displayed in a reversed way in the northern regions, except for the Lower North region, which were experiencing an increase in population growth from the beginning of the 1970s.

### 2.1.1 FERTILITY

Table 2.1 gives total fertility rates for the county regions. The rates have been calculated on the basis of the number of births 2 years before and after each of the census years between 1950 and 1970 and for the single year 1974. The total fertility rates for county regions, to a limited extent only, depict the development of fertility at the national level. Over the entire 25-year period, fertility declined by about 20 percent in southern and central Sweden and by between 25 and 30 percent in the north. At the same time the regional variation has been reduced as is seen from the standard deviations (unweighted) in the lower part of Table 2.1.

The analysis of regional variations in fertility carried out at the Forecasting Institute for 1968–1973 corroborates this general view. The regional pattern is fairly complicated. High-fertility regions are concentrated in the western part of the country. The Stockholm region is the most heterogeneous region in this respect. The central part of the region (the Stockholm municipality) has the lowest fertility level in the country while 3 suburban municipalities in the region have the highest level. Fertility development during 1968–1973 varied throughout the regions. Those with a high fertility rate during the first part of the period showed a steeper fall latterly than those with a lower level initially. The analysis also confirms the previous conclusion that regional differences have been smoothed out to some extent during recent years. Not only the level of fertility varied between regions, but also the structure of fertility. To the east the fertility of women over 30 became lower. On the other hand, the fertility of younger women was higher in the eastern part than in southwestern Sweden. In central Sweden the downward movement of childbirth into younger age groups became most pronounced. In the northern-most part of the country fertility was still relatively high for women over 30, while fertility for women under 30 was low. The total numbers of births by age of mothers and by regions in 1974 are given in Appendix A. The age- and region-specific fertility rates are shown in Appendix B.

In a preliminary study with data from Jönköping county, in the southern part of the country, a number of economic factors were analyzed with respect to their relation to a fertility measure (see Andersson and Holmberg 1978). In a regression analysis where all women were considered as one single group, the relation to economic variables tended to be fairly weak. However, the very strong, positive relation with marital status and age, as explanatory variables, and the number of children may tend to obscure possible influences of socioeconomic

TABLE 2.1 Total fertility rate by region ( $\times 1,000$ ); census years 1950–1970 and 1974.

Region	Total fertility rates					Index <sup>a</sup>
	1950	1960	1965	1970	1974	
Stockholm	2,059	2,150	2,212	1,733	1,654	80
East Middle	2,354	2,281	2,456	1,964	1,875	80
South Middle	2,409	2,240	2,476	2,069	1,941	80
South	2,256	2,154	2,062	1,930	1,814	80
West	2,230	2,229	2,448	2,028	1,851	83
North Middle	2,344	2,263	2,388	1,886	1,785	76
Lower North	2,426	2,130	2,347	1,908	1,800	74
Upper North	2,788	2,407	2,430	1,961	1,952	70
Unweighted average	2,358	2,232	2,352	1,935	1,834	
Standard deviation	209.94	90.45	144.67	101.48	95.39	
Coefficient of variation (%)	8.9	4.1	6.2	5.2	5.20	

<sup>a</sup>Total fertility rates 1950 = 100.

SOURCE: Central Bureau of Statistics.

variables on fertility as measured in the above way. Therefore, a new set of regression equations were estimated separately for all women and for married women distributed by age in 5-year age groups (20–24, . . . , 35–39 years).

In this analysis age was found to be an important factor in all age groups except for the highest. Family income had a negative effect upon fertility whenever it was included. Education too was a factor with negative influence on fertility.

The result of this preliminary analysis of regional variation in fertility pointed to the importance of including differences in social variables between regional environments in further studies. Changes in background variables may have a considerable influence on the future development of fertility within regions. In the present study specific fertility data are used for each region (Appendix A). The differences in fertility levels between the regions are seen in Table 2.1. The variations in the total fertility rate reflect, to some extent, the variations accounted for in the study by the Forecasting Institute mentioned previously.

### 2.1.2 MORTALITY

Table 2.2 presents infant mortality rates for the county regions for 5-year periods (1951–1955, . . . , 1971–1975). Infant mortality has steadily declined over the

TABLE 2.2 Infant mortality rates by region; 5-year periods 1951–55 to 1971–1975 (per 1,000).

Region	1951–55	1956–60	1961–65	1966–70	1971–75	Index <sup>d</sup>
Stockholm	17.8	15.9	15.6	11.4	9.2	52
East Middle	18.4	16.2	13.8	12.2	10.3	56
South Middle	20.2	17.3	15.3	13.7	10.6	52
South	19.5	20.2	15.6	12.4	9.5	49
West	17.3	16.2	14.6	12.2	10.2	59
North Middle	20.7	17.1	15.5	12.7	11.0	53
Lower North	19.4	16.2	13.0	10.3	10.6	55
Upper North	23.1	17.9	14.5	13.3	10.0	43
Unweighted average	19.5	17.1	14.7	12.3	10.2	
Standard deviation	1.84	1.42	0.95	1.07	0.60	
Coefficient of variation (%)	9.4	8.3	6.5	8.7	5.9	

<sup>d</sup>Infant mortality rates 1951–1955 = 100.

years and the level for 1971–1975 is, on average, only 50 percent of the 1951–1955 level. As in the case of fertility rates the regional variation of infant mortality has been reduced.

Table 2.3 presents a mortality index defined as the sum of the age-specific mortality rates for ages 0–79. The mortality index takes into account both infant and adult mortality. Regions in the south of Sweden appear to have a slightly lower level of mortality than the rest of the country. The difference between the highest and the lowest level of mortality was approximately 14 percent in 1974 as compared to approximately 22 percent in 1950. According to this measure mortality has declined by almost 20 percent over the 25-year period. There is no apparent correlation between the levels of infant and adult mortality. The variations are in opposite directions for many regions. The rank correlation is, in fact, higher between the levels of fertility and infant mortality than between infant and adult mortality (0.38 and 0.14 respectively).

The regional variation in mortality has been studied at the Forecasting Institute and a report has been published.\* According to this investigation there exist differences in mortality that may have a considerable influence on regional population projections. A calculation of life tables for counties for the period 1966–1970 revealed a significant difference in the mean expectation of life at birth. For males the lowest value was 70.57 years (Stockholm county) and the

\*Regional dödlighet 1970–1975 (Regional Mortality 1970–1975). Information i Prognosfrågor 1978:6 (Forecasting Information).

TABLE 2.3 Mortality indices (sum of age-specific mortality rates 0–79 years × 1,000) for regions; 1950, 1960, 1970, and 1974.

Region	Mortality index				Index <sup>a</sup>
	1950	1960	1970	1974	
Stockholm	1,023	922	846	812	79
East Middle	1,035	896	806	817	79
South Middle	996	850	773	767	77
South	952	819	751	750	79
West	1,022	846	763	757	74
North Middle	1,097	929	835	839	76
Lower North	1,070	914	836	854	80
Upper North	1,165	981	844	851	73
Unweighted average	1,045	895	807	806	
Standard deviation	65.4	53.2	39.2	42.5	
Coefficient of variation (%)	6.3	6.0	4.9	5.3	

<sup>a</sup>Mortality index 1950 = 100.

SOURCE: Hofsten and Lundström (1976). 1950–1974 *Befolkningsförändringar. Del 3 (Population Changes. Part 3)*.

highest value was 73.47 years (Kristianstad county in southern Sweden). A corresponding variation for females was a low of 75.79 years (Värmland county in the western inland areas and a high of 78.11 years (Kristianstad county).

The factors causing these variations have only been crudely analyzed. Preliminary analysis reveals the major factors to be associated with industrialization and urbanization. For a deeper analysis a more detailed regional system is required, e.g., the study carried out by the Forecasting Institute.

Most of the variation is leveled out when regions are aggregated, as in this study. Nevertheless, a certain amount of variation persists (Table 2.4). The figures are calculated from the mortality schedule of a given region by the single-region life table program contained in the IIASA package (Willekens and Rogers 1978). A smaller range in the mean expectations is also affected by the smoothing effect of migration. Migration can mean that newborn children spend only 30–40 years in their region of birth. According to the hypothesis employed in the IIASA analyses, people who migrate immediately attain the mortality level in the region of their destination. A more reasonable hypothesis would have to be formulated in terms of duration-of-stay effects.

TABLE 2.4 Expectation of life at birth, by sex and region; 1974.

Region	Males	Females
Stockholm	71.65	78.30
East Middle	72.48	78.06
South Middle	73.00	78.18
South	73.18	78.81
West	72.81	78.61
North Middle	71.19	77.63
Lower North	71.82	77.35
Upper North	72.42	77.76
Total average	72.45	78.22

### 2.1.3 MIGRATION

The age distribution of migration has a very distinct pattern common to many countries (e.g., Rogers *et al.* 1977). Apart from random fluctuations, the migration rates shown in Figure 2.2 may be taken to represent all counties in Sweden.

The IIASA population projection model also requires data on migration from a given region to each of the remaining regions. A gross migration matrix (GMM) is given in Table 2.5. Both men and women have a very similar distribution of migration over regions. The table also shows that a large proportion of all migration is concentrated in destinations that are geographically close to the home region. The Stockholm region is an exception from this rule: migration from this region is distributed more evenly over the remaining regions. The two northern regions are at the opposite extreme, with over 30 percent of the migration directed toward the Stockholm region and only 15–16 percent of the migration going to the nearest region.

There is a tendency for women moving from the two northern regions to choose the highly urbanized Stockholm region as their migration destination. Men seem to be more tied to regions close to their home region. In the age-group 20–24 (Table 2.6) this tendency becomes more pronounced for both sexes. Young people in all regions, with few exceptions, seem to have a very strong propensity to move to the Stockholm region.

## 2.2 Regional Disaggregation and Aggregation used in the IIASA Population Projections

The various administrative regions mentioned in Section 1.2 are not well suited for demographic analysis. The exception is the system of A-regions. These were constructed to represent the boundaries of local labor markets. The A-regions are of great importance for spatial population analysis because variations in

TABLE 2.5 Gross migration matrix (GMM). Percentage distribution. All ages.

Region of destination	Region of origin															
	Stockholm		East Middle		South Middle		South		West		North Middle		Lower North		Upper North	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
Stockholm	0.0	0.0	31.2	32.0	16.9	16.3	21.3	21.5	18.0	18.8	23.7	25.4	28.1	31.3	26.5	31.3
East Middle	34.4	34.6	0.0	0.0	21.2	21.4	16.6	15.5	19.9	19.5	32.2	32.4	18.8	18.5	22.5	22.1
South Middle	9.4	9.1	10.7	10.7	0.0	0.0	23.5	24.4	16.4	16.6	4.6	4.6	4.0	3.5	4.9	4.7
South	11.9	11.4	10.4	10.2	26.1	26.2	0.0	0.0	20.4	21.0	5.6	4.9	6.4	5.7	6.3	5.5
West	11.2	11.2	16.1	15.9	25.4	26.6	25.2	25.8	0.0	0.0	18.7	19.5	10.6	11.0	13.0	11.4
North Middle	16.1	16.5	18.6	18.5	5.5	5.0	6.6	6.4	14.3	13.8	0.0	0.0	14.9	13.6	10.5	9.9
Lower North	8.8	9.1	5.9	5.8	1.8	1.6	2.8	2.7	4.7	4.6	8.7	7.4	0.0	0.0	16.3	15.1
Upper North	8.2	8.0	7.1	6.9	3.1	2.8	4.0	3.8	6.3	5.7	6.5	5.9	17.2	16.4	0.0	0.0
Total	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

SOURCE: Calculated from raw data (Appendix A).



TABLE 2.6 Gross migration matrix. Percentage distribution. Ages 20–24 years.

Region of destination	Region of origin															
	Stockholm		East Middle		South Middle		South		West		North Middle		Lower North		Upper North	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
Stockholm	0.0	0.0	39.1	36.1	22.1	16.0	24.2	21.5	20.5	19.5	30.1	30.4	35.0	38.8	36.0	37.2
East Middle	35.2	34.4	0.0	0.0	21.2	21.9	17.0	15.7	20.8	19.8	32.6	31.9	20.2	19.0	22.3	20.9
South Middle	7.9	8.3	9.0	10.3	0.0	0.0	25.0	23.7	15.3	16.9	2.0	2.8	3.0	2.3	2.7	2.6
South	12.2	9.3	9.4	9.3	26.2	26.2	0.0	0.0	20.5	21.9	4.4	3.8	5.6	5.4	5.4	5.8
West	13.6	11.4	16.3	17.2	32.8	27.0	22.5	27.6	0.0	0.0	19.3	20.7	11.8	9.2	12.5	12.1
North Middle	13.2	16.3	15.5	16.0	4.0	4.5	5.5	5.4	13.1	12.2	0.0	0.0	12.6	11.6	8.0	7.0
Lower North	7.7	8.6	4.5	5.0	1.4	1.9	3.0	2.2	4.2	4.6	7.4	5.9	0.0	0.0	13.1	14.4
Upper North	10.2	11.6	6.2	6.2	2.3	2.4	2.8	4.0	5.6	5.2	4.4	4.5	11.8	14.0	0.0	0.0
Total	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

SOURCE: Calculated from raw data (Appendix A).

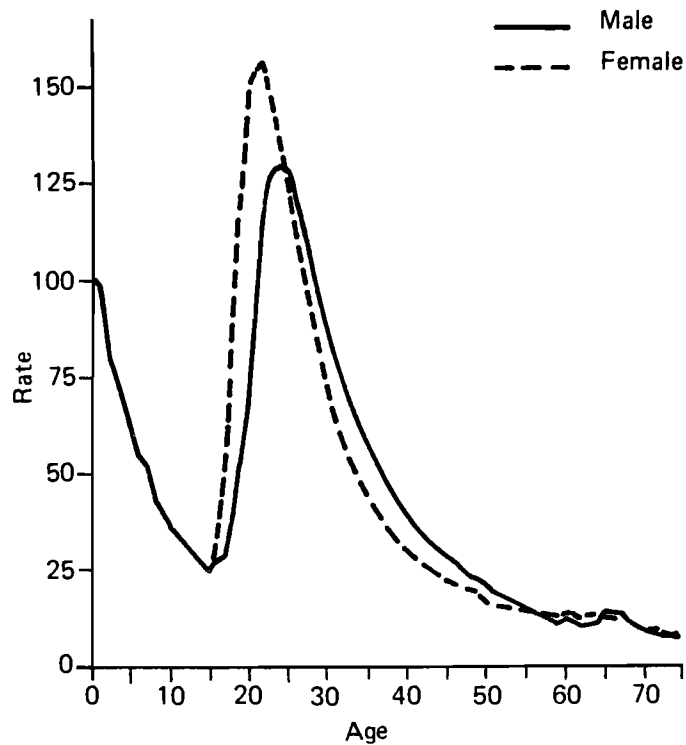


FIGURE 2.2 Age-specific annual migration rates by sex; averages for the period 1968–1973. Source: Andersson and Holmberg (1978).

labor-market conditions are closely related to migratory movements. Therefore, a regional system based on labor-market regions would be a valuable basis for the study of internal migration. On the other hand, such a large number of regions may be difficult to handle, even with the use of a computer for analysis. Several attempts have been made to construct other regional systems more suitable for computer-based demographic analysis. These regional systems were designed to be used for studying fertility, mortality, and migration.

In a study of regional variations in fertility in Sweden for the years 1968–1973 a regional system of 117 fertility regions was constructed using municipalities as the primary units. The following conditions were used in the delineation of the fertility regions: contiguity, similarity of level of urbanization, similarity of economic structure and migration pattern, and similarity of levels of labor-market participation rates for women. Most municipalities were included in regions comprising 2 or 3 municipalities; 38 of the largest municipalities formed regions of their own. One of the leading principles in the construction of these regions has been to obtain a sufficiently large population for the calculation of age-specific fertility rates.

Regional variations in mortality have been studied on several occasions in

Sweden. In a 1976 study attempts were made to construct mortality regions on the basis of counties. Four distinct clusters could be separated for males; the first cluster comprised counties in southern and western Sweden, the second counties in central Sweden, the third included the metropolitan counties and the two northernmost counties, and the fourth, which only comprised three counties, was in the southeastern part of the country. The regional variation in female mortality was less pronounced and the clusters were more homogeneous. There was an aggregation to 5 clusters: the first cluster was formed by the two largest metropolitan counties, Stockholm and Gothenburg the second included the two northern counties, the third was formed by the counties in southern Sweden, and the fourth and fifth clusters were formed from the counties in central Sweden.

The most important conclusion to be drawn from the study was that there exists a distinct pattern in the regional variation in mortality. This conclusion has led to the implementation of a more comprehensive study of regional mortality, including the construction of a consistent regional system for mortality studies. In this study, which was carried out at the National Central Bureau of Statistics, municipalities and A-regions were used as primary units.

In the study,\* which was part of the series *Forecasting Information* produced by the Forecasting Institute at the National Central Bureau of Statistics, it was revealed that no subdivision into a smaller number of regions, as in the IIASA studies, would be sufficient to describe the regional mortality variation.

The third attempt to construct a regional system was initiated in a study of internal migration by the authors of this report (Andersson and Holmberg 1978). Preliminary estimates of migration equations appeared to have a distinct spatial structure. It was, therefore, considered necessary to determine whether the country could be regarded as homogeneous with respect to the determinants of migration. A subdivision of the country into different clusters in which the migration behavior is homogeneous and separated from the rest of the country may be primarily motivated by the upgrowth of spatial regions with very high information density. Because of this, a number of cluster studies were carried out on the A-regions. The purpose of the studies was to see whether regions with a similar distribution of out-migration and in-migration were linked together in any apparent spatial pattern. As a criterion of the difference between A-regions with respect to the destination of their migration a  $\chi^2$ -measure was used. This measure expresses the deviation between observed and expected frequencies for each pair of rows in the migration matrix. The expected frequencies are calculated on the basis of a hypothesis of a uniform distribution with fixed marginal distributions.

A cluster analysis is designed to aggregate elements for which there are observations on a number of variables. The observations in this case were each of the 70 A-regions regarded as elements and in-migration from the remaining

\*Regional dödlighet 1970–1975 (Regional Mortality 1970–1975). Information i Prognosfrågor 1978:6 (Forecasting Information).

69 regions to a given region as a vector of variables; the total in-migration to the given region was regarded as the 70th variable. The results are shown in Figure 2.3 where seven clusters of A-regions are distinguished.

The country can be crudely subdivided into two main regions. The northern region can be divided further into two subregions and the southern region into four subregions.

Since the symmetric property of the matrix representing net migration is not preserved, when gross migration is considered, we may reasonably assume that the transposed migration matrix may also be of interest to study. In this case the regions are clustered with respect to the destination of their out-migration. The result is shown in Figure 2.4 and only some minor differences in comparison with the above analysis are revealed. The two main regions are divided into six subregions, of which two are to be found in the northern main region.

The purpose of the cluster analysis was to establish whether regional migration in the country shows any specific patterns and if it is possible to form large contiguous regions that are homogeneous with respect to regional migration patterns. A close correspondence was found to exist between the systems of regions obtained by considering similarities in the migration flows both by origin and by destination.

The cluster analysis was used only as an indication as to how the final regional system should be constructed. The first step was to separate the three large metropolitan A-regions: Stockholm, Gothenburg, and Malmö. Furthermore it was judged necessary to represent separately the inland and coastal areas of the two northern regions. The final result was 13 so-called M-regions.

The regional system employed in the present study is similar to the system of M-regions. Table 2.7 gives an overview of the relationship between the three systems.

### *2.3 Observations of Aggregation Errors Due to Limitation of the Number of Regions*

The IIASA models for population projections are normally adapted to a small number of contiguous and rather large regions. This can cause important errors of aggregation in the sense that large intraregional variations in mortality, fertility, and mobility are disguised in macroaggregates. Our studies of regional mobility patterns in Sweden have shown that such errors of aggregation are not so serious in the case of migration. There is, however, reason for caution in the cases of mortality and fertility. As indicated in Figures 2.5 and 2.6 high-mortality and high-fertility locations are scattered all over the country without any easily detected and smooth distance-decay effects as there are for migration.

The aggregation problems are especially pronounced in the Upper North region. There subareas of very high fertility are mixed with ones at the other extreme of the fertility distribution.

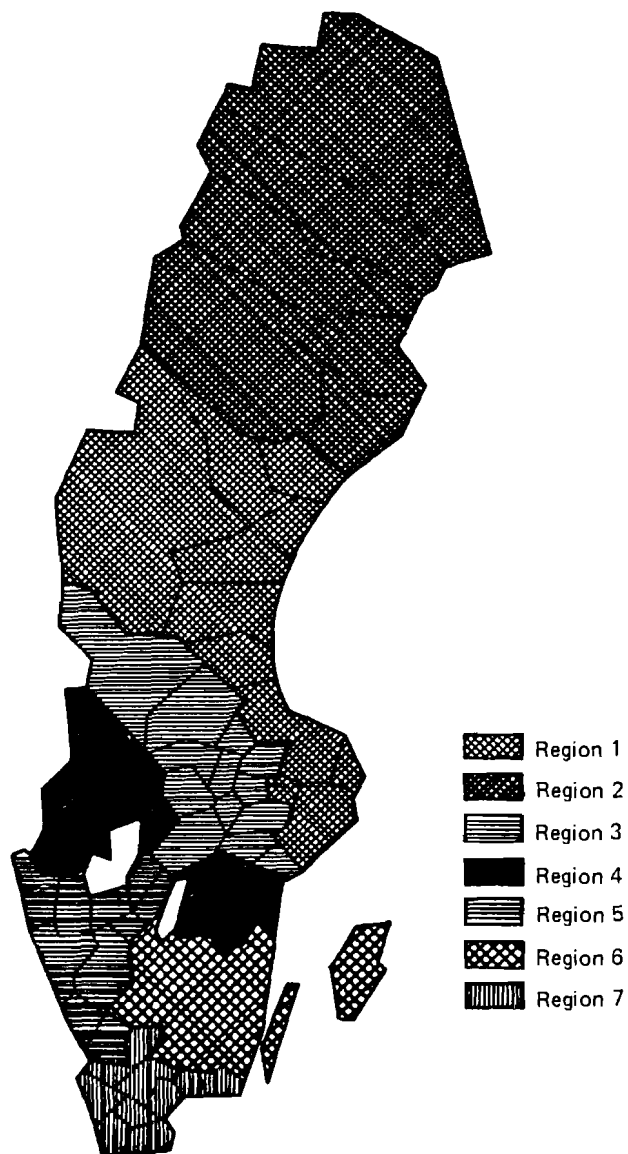


FIGURE 2.3 Functional regional aggregation on the basis of origin of in-migrants. Source: Calculated from raw data. 1951–1960 *Befolkningsrörelsen*; 1961–1966 *Folkmängdens förändringar*; 1967–1975 *Befolkningsförändringar. Del 3 (Population Changes. Part 3)*.

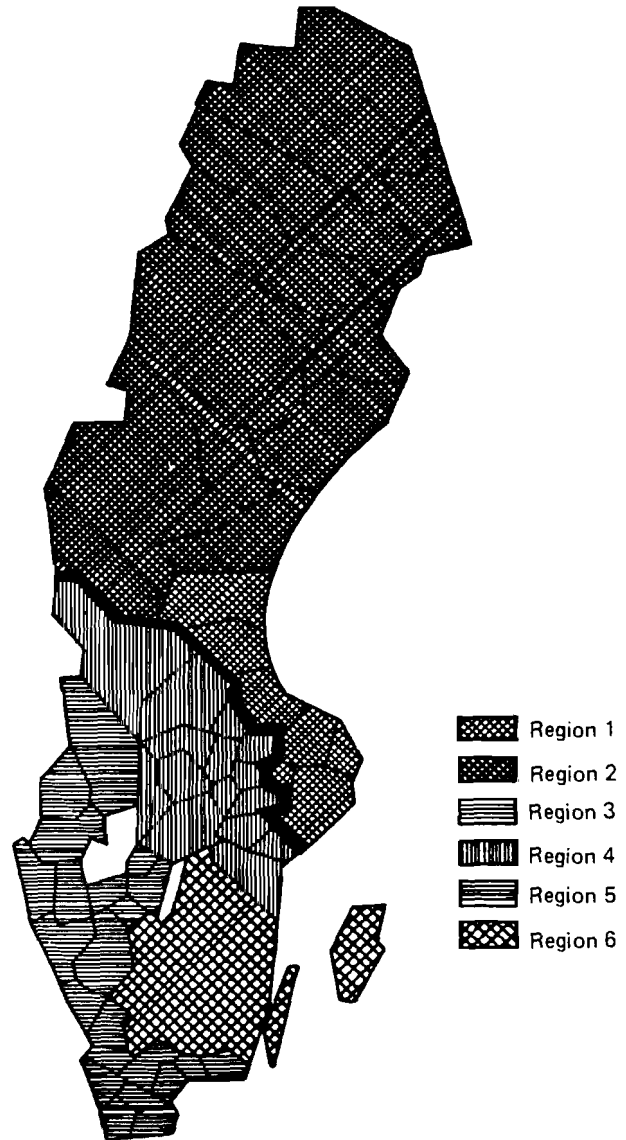


FIGURE 2.4 Functional regional aggregation on the basis of destination of out-migrants. Source: Den inrikes omflyttningen 1968–1973: storlek, mönster och flyttningsavstånd (Internal migration in Sweden 1968–1973: size, pattern and migration distance); Information i Prognosfrågor 1974:9 (Forecasting Information).

TABLE 2.7 Comparison of three different regional systems: the M-regions, the county regions and the CMS Study regions.

CMS Study region	County region	M-region (county and A-region)
1 Stockholm	1 AB	1 Stockholm A-region AB except A2
2 East Middle	2 CDETU	—
3 South Middle	3 FGHI	5 Småland FGHI
4 South	4 KLM	6 Southern Sweden KLM except A28
5 West	5 NOPR	7 Western Sweden NOPR except A33 in O county and A43 in P county
6 North Middle	6 SWX	8 Southwest inland S and A46 in T county
7 Lower North	7 YZ	11 Middle North inland Z and A61 in Y county
8 Upper North	8 ACBD	{12 Upper North inland AC, BD 13 Upper North coastal area AC, BD
—	—	2 Gothenburg A-region
—	—	3 Malmö A-region
—	—	4 Östergötland E
—	—	9 Central Sweden TUV and A5–A7 in D county except A46 in T county
		10 Middle North coastal area CXY and A2 in AB county except A61 in Y county

SOURCE: Hofsten and Lundström (1976). 1974 Befolkningsförändringar. Del 3 (Population Changes. Part 3).

NOTE: For explanation of symbols see Figure 1.1, cf. also Figure 1.2.

### 3 MULTIREGIONAL POPULATION ANALYSIS

#### 3.1 Introduction

Population models are based on a number of assumptions, such as constant fertility and mortality and the absence of external migration. Classical demographic analysis has been oriented to the development of populations over time. The spatial aspect was not included. In contrast, spatial and also social mobility has been a major focus of interest for economists, geographers, and sociologists. During recent years demographers have been increasingly interested in formulating multiregional versions of available demographic models.

Originally, Lotka (1907) derived his population growth model in continuous terms. The discrete formulation was suggested by Bernadelli (1941) and in a more elaborate way by Leslie (1945). By introducing a matrix operator, demographic projections may be carried out easily. Although theoretically the results of the continuous and discrete models are analogous to each other, the discrete approach has certain advantages, especially when large computers can be used for the calculations.

Formulated as a discrete matrix model, the one-region population growth

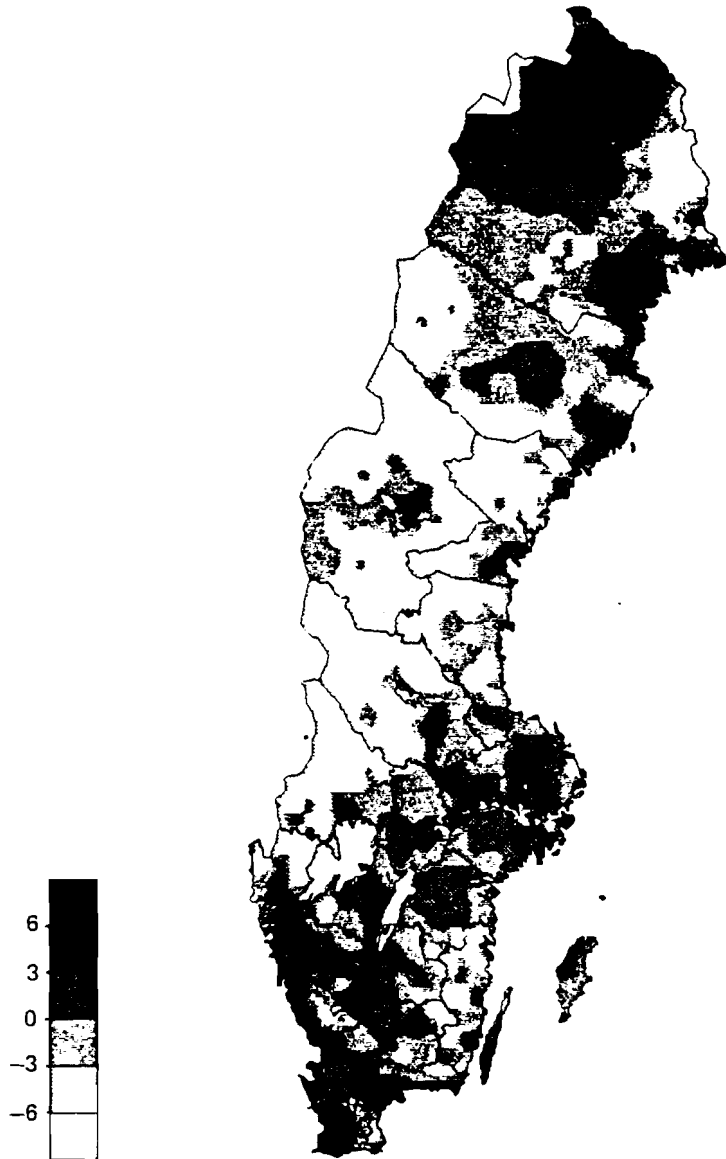


FIGURE 2.5 Natural increase of population per 1,000 of mean population (1975). Source: Befolkningsförändringar 1975. Del 3 (Population Changes 1975. Part 3).



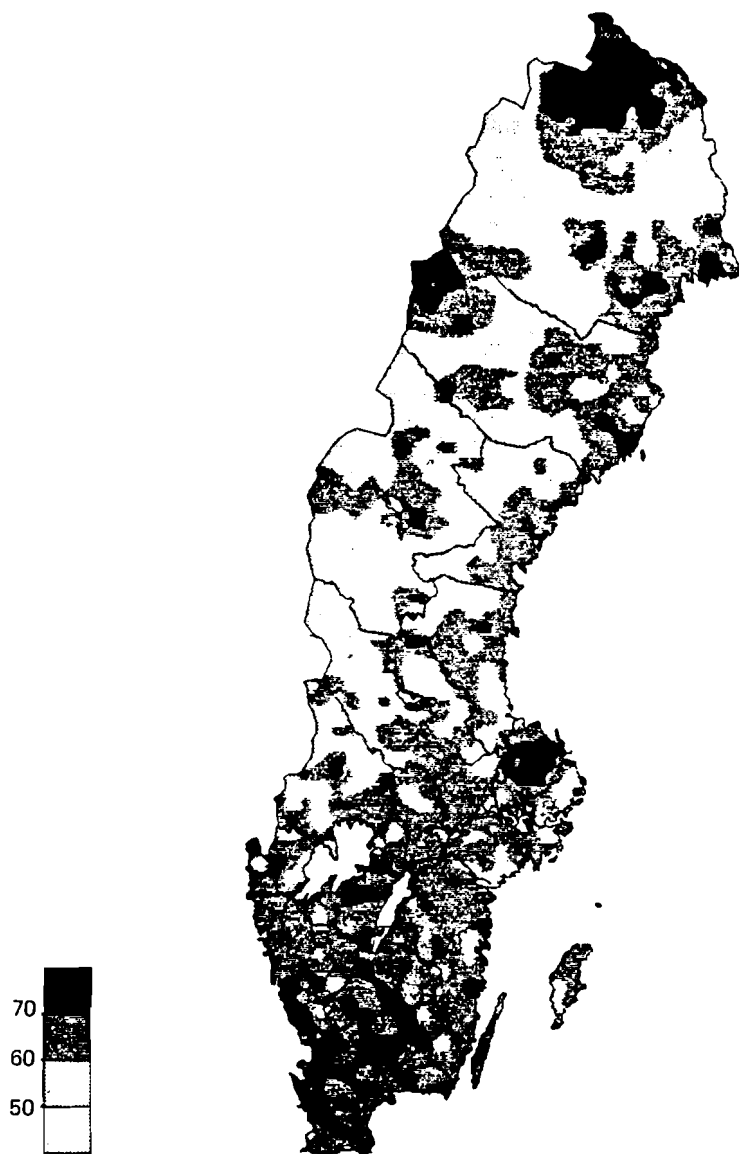


FIGURE 2.6 Live births per 1,000 women of ages 15–44 years (1975). Source: Befolkningsförändringar 1975. Del 3 (Population Changes 1975. Part 3).

model is easily expanded to a large number of regions; the number of regions is mainly limited by the capacity of the computer. The assumptions underlying this multiregional model are similar to those on which the one-region model is based: age-specific rates of fertility, mortality, and migration are fixed and the population is closed to external migration. Migration between the regions within the model is, however, permitted.

The basic mathematics of multiregional demographic growth have been elaborated at IIASA and are contained in computer programs to provide users with a ready tool for population analysis. These programs, and the underlying theoretical analysis, are published elsewhere (Willekens and Rogers 1978). The IIASA projection models have been used for the projections for Sweden, presented in this report.

The following sections deal explicitly with the characteristics of the multiregional population change. First, the multiregional life table for Sweden is presented; fertility and mobility analysis is then performed using the multiregional demographic theory, and finally the results of a multiregional population projection for Sweden are discussed. These projections are carried out with constant schedules of fertility, mortality, and migration. The schedules of age-specific rates are given in Appendix B.

### *3.2 The Multiregional Life Table*

The multiregional life table shows the combined effect of mortality and mobility on survival of individuals in a set of regions. All biometric functions of the single-region table are thus given a multiregional equivalent. In order to illustrate the multiregional population system, multiregional life-table functions are presented below. Table 3.1 gives the probabilities of survival from birth to age 20 by region. These probabilities tell us what proportion of a given birth cohort will survive 20 years. Information is given not only about total survival but also about where the person survives.

Regional differences in survival probabilities are negligible. There is, however, a much larger variation in the proportion surviving in the region of birth. The largest value, 0.77, is recorded for the West region and the smallest, 0.63, is for Stockholm. Table 3.1 also gives some idea about the variations in directional migrations between regions. Cohorts born in the northern regions generally have a higher probability of surviving in the Stockholm region than cohorts born in the South and West regions (Table 3.1, first row).

Expectations of life at birth and at age 20 are shown in Tables 3.2 and 3.3. The complete table for expectation of life is given in Appendix C. The calculation of regional life tables is based on the hypothesis that the mortality rate which applies to an individual is determined by his region of residence. This means that a person who moves is exposed to the mortality rate prevailing in his new region of residence. This leads to a number of interesting consequences. The mortality rate which applies to an individual is determined not only by his

TABLE 3.1 Probabilities of survival from birth to exact age 20 by region. Total population; 1974.

Region of residence at age 20	Region of birth							
	Stockholm	East Middle	South Middle	South	West	North Middle	Lower North	Upper North
Stockholm	0.63146	0.09820	0.05513	0.04357	0.03892	0.07428	0.09577	0.08555
East Middle	0.11226	0.63476	0.06791	0.03752	0.04245	0.09479	0.06390	0.06134
South Middle	0.03533	0.03768	0.64697	0.04991	0.03469	0.01893	0.01760	0.01681
South	0.04349	0.04138	0.08166	0.76456	0.04271	0.02264	0.02542	0.01982
West	0.04670	0.06055	0.08744	0.05572	0.76891	0.06209	0.04454	0.03882
North Middle	0.05661	0.06364	0.02205	0.01713	0.03048	0.66400	0.04831	0.02940
Lower North	0.03102	0.02123	0.00722	0.00734	0.01083	0.02408	0.63318	0.03451
Upper North	0.02878	0.02664	0.01167	0.00974	0.01431	0.02200	0.05180	0.69720
Total	0.98563	0.98407	0.98005	0.98161	0.98328	0.89300	0.98052	0.98346

SOURCE: From computer output of model applications.

TABLE 3.2 Expectation of life at birth by region of birth. Total population; 1974.

Region of residence	Region of birth							
	Stockholm	East Middle	South Middle	South	West	North Middle	Lower North	Upper North
Stockholm	37.5	10.0	6.6	5.7	5.2	8.3	9.8	8.6
East Middle	10.5	36.6	7.4	5.0	5.4	9.6	7.6	7.3
South Middle	3.7	4.0	36.0	5.3	3.9	2.6	2.4	2.3
South	5.2	5.1	9.0	47.0	5.6	3.5	3.7	3.3
West	6.2	7.5	10.0	7.4	48.3	7.7	5.8	5.4
North Middle	5.8	6.4	3.1	2.6	3.7	37.9	5.4	4.1
Lower North	3.1	2.4	1.2	1.1	1.5	2.7	34.7	4.0
Upper North	3.3	3.0	1.7	1.5	1.9	2.7	5.4	40.0
Total	75.2	75.2	75.1	75.6	75.4	74.9	74.8	75.0

SOURCE: From computer output of model applications.

region of birth but also by the mortality levels in the regions that are dominant destinations of migratory moves from his home region. A person may thus either lose or gain in total expectation of life as a consequence of migration. Since there are only minor mortality differences between the regions, the differences between expectation of life, according to the multiregional life table and the single-region life tables, are almost negligible as shown in Table 3.4.

The consequence of interregional migration for the distribution of expectations of life as derived from the multiregional population model, is clearly shown in Table 3.4. The variation of the expectation of life as measured by the standard deviation is reduced by 50 percent in the multiregional life tables.

From Table 3.2 the following type of information can be gathered. A person born in Stockholm can expect to live 75.2 years, out of which 37.5 years, i.e. close to 50 percent, are spent in his region of birth, 10 years are lived in the East Middle region, 3.7 years in the South Middle, and so on. The distribution of the mean expectations over the different regions tells us something about the mobility pattern. For example, people born in the two northern regions (Lower North and Upper North) spend a large proportion of their lives in the Stockholm and East Middle regions. When seen in this perspective, southern Sweden and the West Coast appear to be the most stable parts of Sweden. Over 60 percent of the total lifetime of an individual born in either of these two regions is spent in the region of birth.

The differences in the expectation of life at age 20 are even smaller than those at birth, as seen from Table 3.3. This is in line with the observations made earlier that the largest differences in mortality are observed in the early years of life. The expectation of life at age 20 reveals more about the mobility

TABLE 3.3 Expectation of life at age 20 by region of birth. Total population; 1974.

Region of residence	Region of birth							
	Stockholm	East Middle	South Middle	South	West	North Middle	Lower North	Upper North
Stockholm	22.5	9.2	6.2	5.3	4.9	7.8	9.1	8.1
East Middle	9.1	21.3	6.7	4.6	5.0	8.6	7.0	6.7
South Middle	3.3	3.6	20.4	4.7	3.5	2.4	2.2	2.2
South	4.8	4.8	8.3	30.2	5.2	3.3	3.5	3.1
West	5.7	6.9	9.2	6.9	31.6	7.1	5.5	5.2
North Middle	5.2	5.6	2.9	2.4	3.4	21.9	4.9	3.8
Lower North	2.6	2.2	1.2	1.1	1.3	2.4	18.9	3.6
Upper North	2.9	2.7	1.6	1.4	1.7	2.5	4.8	23.4
Total	56.2	56.3	56.6	56.6	56.5	56.1	56.1	56.2

SOURCE: From computer output of model applications.

TABLE 3.4 Expectation of life at birth according to multiregional and single-region life tables; 1974.

Region	Multiregional life table	Single-region life table
Stockholm	75.22	75.03
East Middle	75.17	75.13
South Middle	75.15	75.42
South	75.60	75.92
West	75.36	75.57
North Middle	74.92	74.52
Lower North	74.76	74.37
Upper North	75.03	74.87
Weighted average for all Sweden	75.23	
Calculated value for all Sweden		75.21
Standard deviation	0.26	0.52

SOURCE: From computer output of model applications.

pattern. The proportion of remaining lifetime spent in the region of birth has been reduced further and is, for most regions, below 40 percent. The two regions South and West are outstanding as exceptions from the general pattern as more than 50 percent of the remaining lifetime at age 20 is spent in the region of birth. The Lower North region appears to be the most mobile region: for persons born in this region slightly over 30 percent of the remaining lifetime at age 20 is spent in the region of birth, and approximately 25 percent of the remaining lifetime is spent in the Stockholm and East Middle regions.

### *3.3 Fertility and Mobility Analysis*

The multiregional population model makes it possible to calculate regional reproduction rates which may be seen as age-standardized fertility measures. The multiregional net reproduction rate (NRR) is equivalent to the more conventional single-region net reproduction rate generally calculated in classical demographic analysis. It is the number of children (daughters) a parent (woman) would have during his (her) lifetime if subject to the observed fertility and mortality pattern. The major difference is due to the fact that the effect of migration, in addition to mortality, is taken into account. According to the hypothesis employed in the IIASA model, people who migrate adopt the fertility and mortality regimes prevailing in their new region of residence. Another property of the multiregional population model is that it makes it possible to calculate the net addition to a region's NRR from people born in all other regions. The difference between the multiregional and the single-region NRR is shown in Table 3.5.

The regional NRR varies from the lowest level of 0.87 in the Stockholm region to 0.92 in the South Middle region. The smoothing effect of migration on fertility differences is clearly seen when the multiregional reproduction rates are compared with the single-region rates. The latter rates show a more pronounced regional variation, from the lowest level of 0.84 in the Stockholm region to 0.95 in the South Middle region.

In a way similar to the procedure used when distributing mean expectations of life at various ages over regions, the net addition from all other regions to the NRR of a given region can be calculated separately. According to Table 3.6 cohorts of the Lower North region spend a larger proportion of their fertile life outside their region of birth, as only 45 percent of their total reproduction takes place in the region of birth. At the other extreme are the South and West regions, where approximately 65 percent of the total reproduction takes place in the region of birth. This is, to some extent, a reflection of the much higher stability of these two regions.

Another aspect of the migration pattern can be obtained from the net migraproduction rate (NMR). This measure is similar to the net reproduction rate when mortality is taken into account and it tells us the average number of moves (crossing regional boundaries) a person with a given region of birth will

TABLE 3.5 Net reproduction rates according to the multiregional and the single-region population models; 1974.

Region	Multiregional population model	Single-region population model
Stockholm	0.873	0.843
East Middle	0.913	0.927
South Middle	0.918	0.946
South	0.903	0.904
West	0.907	0.913
North Middle	0.891	0.872
Lower North	0.883	0.873
Upper North	0.915	0.943
Weighted average for all Sweden <sup>a</sup>	0.901	
Calculated value for all Sweden		0.900
Standard deviation	0.016	0.037

<sup>a</sup>Dominant eigenvalue of the net rate of reproduction matrix.  
SOURCE: From computer output of model applications.

make during his lifetime, given that the prevailing mortality and migration regimes remain constant. The effect of basing the calculation of the NMR on the multiregional population model as compared to the single-region population model is presented in Table 3.7.

The differences between the multiregional migration rates and the single-region rates are larger than the corresponding differences between mortality and fertility measures. The implications of this finding are, however, much more difficult to interpret. As was mentioned earlier, probabilities of migration are based on moves. Consequently the same person can be represented more than once in migration statistics. Mobility rates are, therefore, slightly inflated in comparison with probabilities based on census data. The same mobility pattern as reflected in the expectations of life and reproduction rates is directly displayed in Table 3.8.

For most regions, more than 60 percent of the total number of moves are made out of the region of birth. The two northern regions are exceptions in this case as less than 60 percent of the moves are made out of these regions. Furthermore approximately 20 percent of their moves are made out of the Stockholm and East Middle regions. This can probably be interpreted as a reflection of a higher tendency of return migration to the northern regions.

TABLE 3.6 Multiregional net reproduction rates by region of birth. Total population. Absolute and percentage distribution; 1974.

net reproduction rate										
	stockh.	east-mid	sout/mid	south	west	n.-middl	l.-north	up-north		
stockh.	0.442576	0.126000	0.079703	0.065094	0.058854	0.105429	0.129653	0.114556		
east-mid	0.128696	0.465418	0.091595	0.056143	0.061681	0.122866	0.092925	0.088110		
sout/mid	0.042358	0.047726	0.457966	0.065127	0.045983	0.026978	0.025538	0.024236		
south	0.055323	0.055296	0.107317	0.581584	0.060240	0.034421	0.038592	0.032850		
west	0.068257	0.086499	0.120143	0.084221	0.606137	0.091041	0.067234	0.061927		
n.-middl	0.062384	0.070437	0.030432	0.024233	0.038378	0.449625	0.058946	0.040339		
l.-north	0.033255	0.025685	0.011898	0.010722	0.014639	0.029280	0.402414	0.044229		
up-north	0.039591	0.035894	0.019021	0.016301	0.021202	0.031512	0.067823	0.508561		
total	0.872640	0.912953	0.918075	0.903425	0.907115	0.891151	0.883126	0.914808		
eigenvalue	0.900922									
eigenvector										
- right	1.000000	1.030090	0.557885	0.932375	1.354807	0.574522	0.264477	0.425989		
- left	1.000000	1.074552	1.097223	1.067823	1.076197	1.031500	1.013396	1.080591		
net reproduction allocations										
	stockh.	east-mid	sout/mid	south	west	n.-middl	l.-north	up-north		
stockh.	0.507169	0.138014	0.086815	0.072053	0.064880	0.118306	0.146812	0.125225		
east-mid	0.147708	0.509794	0.099769	0.062145	0.067997	0.137874	0.105223	0.096315		
sout/mid	0.048540	0.052276	0.498833	0.072089	0.050691	0.030273	0.028918	0.026493		
south	0.063397	0.060568	0.116894	0.643754	0.066409	0.038625	0.043699	0.035909		
west	0.078219	0.094746	0.130864	0.093224	0.668203	0.102161	0.076132	0.067694		
n.-middl	0.071489	0.077152	0.033148	0.026823	0.042308	0.504544	0.066747	0.044096		
l.-north	0.038109	0.028134	0.012959	0.011868	0.016138	0.032857	0.455670	0.048348		
up-north	0.045369	0.039316	0.020718	0.018043	0.023374	0.035361	0.076799	0.555921		
total	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000		

SOURCE: From computer output of model applications.



TABLE 3.7 Net migraproduction rates by region of birth according to the multiregional and the single-region population models; 1974.

Region	Multiregional population model	Single-region population model
Stockholm	1.28	1.37
East Middle	1.29	1.41
South Middle	1.21	1.32
South	0.94	0.82
West	0.91	0.78
North Middle	1.21	1.22
Lower North	1.28	1.34
Upper North	1.13	1.09
Weighted average for all Sweden <sup>a</sup>	1.20	
Calculated value for all Sweden		1.14
Standard deviation	0.15	0.25

<sup>a</sup>Dominant eigenvalue of the net migraproduction rate matrix.  
SOURCE: From computer output of model applications.

### 3.4 The Multiregional Population Projection

On the basis of data presented in the preceding sections and the assumptions of stability in mortality, fertility, and migration, a number of projections of the population in the eight regions have been made. Some results are reproduced in Appendix D. The projected long-term changes of regional population shares are summarized in Table 3.9.

The development of population shares is also shown in Figure 3.1. The projections show a trend break for some of the regions but in most regions a continuation of previous trends is projected. According to the projections presented here the “winners” are the regions in southern and western Sweden, and also the northernmost area of the Upper North region. These regions increase their share of the total population by four percentage points. All other regions experience a decreasing share of the country’s population.

A phenomenon observed in all western countries today is the so-called aging of the population, which means that the proportion of elderly people is increasing, while the youngest age-group is experiencing a decline in its share of the total population. In Sweden this can be seen as a steady increase in the mean age of the population. Table 3.10 shows the development of this trend over a 50-year period, up to the year 2024.

TABLE 3.8 Multiregional net migraproduction rates by region of birth. Total population. Absolute and percentage distribution. 1974.

net migraproduction rate									
	stockh.	east-mid	south/mid	south	west	n.-middl	l.-north	up-north	
stockh.	0.795316	0.163244	0.103859	0.087515	0.079207	0.133266	0.160776	0.140128	
east-mid	0.172500	0.799927	0.118476	0.074634	0.082048	0.157486	0.119639	0.113783	
south/mid	0.052124	0.057956	0.746112	0.077617	0.055345	0.033279	0.030778	0.030131	
south	0.044228	0.043983	0.082540	0.572766	0.047582	0.027615	0.030562	0.026049	
west	0.050637	0.063487	0.087169	0.061995	0.555178	0.065620	0.048335	0.044801	
n.-middl	0.078382	0.087208	0.038077	0.030577	0.047647	0.722753	0.072148	0.050019	
l.-north	0.045505	0.034820	0.015787	0.014380	0.019756	0.039214	0.745945	0.058246	
up-north	0.039923	0.036547	0.019236	0.016512	0.021508	0.032293	0.067907	0.670556	
total	1.278615	1.287174	1.211256	0.935996	0.908271	1.211527	1.276089	1.133713	
eigenvalue	1.202811								
eigenvector									
- right	1.000000	1.019403	0.403460	0.266797	0.347619	0.501440	0.289488	0.249268	
- left	1.000000	1.000903	0.808675	0.490671	0.476468	0.890295	1.008430	0.781161	
net migraproduction allocations									
	stockh.	east-mid	south/mid	south	west	n.-middl	l.-north	up-north	
stockh.	0.622013	0.126624	0.085745	0.093499	0.087207	0.109999	0.125991	0.123601	
east-mid	0.134912	0.621460	0.097812	0.079738	0.090334	0.129990	0.093754	0.100364	
south/mid	0.040766	0.045026	0.615982	0.082924	0.060935	0.027468	0.024119	0.026577	
south	0.034591	0.034170	0.068144	0.611932	0.052387	0.022794	0.023950	0.022977	
west	0.039603	0.049323	0.071966	0.066235	0.611247	0.054163	0.037877	0.039517	
n.-middl	0.061302	0.067752	0.031436	0.032668	0.052459	0.596564	0.056538	0.044120	
l.-north	0.035590	0.027052	0.013034	0.015363	0.021751	0.032367	0.584556	0.051376	
up-north	0.031224	0.028394	0.015881	0.017641	0.023680	0.026655	0.053215	0.591468	
total	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	

SOURCE: From computer output of model applications.

TABLE 3.9 Differences in the regional population share<sup>a</sup>.

Region	Increase	Decrease
Stockholm		2.01
East Middle		0.97
South Middle		0.46
North Middle		0.38
Lower North		0.18
Upper North	0.71	
South	1.27	
West	2.01	
Total	3.99	4.00

<sup>a</sup>Share at stability — share in 1974.

In 1974 the mean age of the total population was 37.6 years with a variation from a low of 36.3 years in the Upper North region to a high of 39.2 years in the North Middle region. These two northern regions thus had both the youngest and the oldest populations as measured by mean age. In 2024 the mean age of the total population will be increased to 41.2 years, i.e., a 10 per cent increase, but there is also a strong equalization of mean ages in the regions. The difference between the highest and the lowest mean age is only 1.8 years, as compared to 2.9 years 50 years earlier. These two northern regions still have the youngest and the oldest populations in the 2024 projection.

Behind the increase in the mean age of the population lies an increase in the share of older people but also a decrease in the proportion of young people — an aging both at the apex and at the base of the age pyramid (Table 3.11).

Figure 3.1 indicates the stable regional distribution of the population. As shown the regional distribution of the population is already very close to stability near the year 2024. The distribution by large age groups is also very close to stability (Table 3.11).

The share of the youngest age group decreases by approximately 3.5 percentage points while the oldest age group (65 + years) increases its share by 4.5 percentage points. This leads to a net decrease in the active ages of approximately 1 percentage point. There is a considerable variation between the different regions, from a low of 0.7 percentage points in the South Middle region to a high of 2.1 percentage points in the Upper North region, although a leveling-out of the share of active ages has occurred.

An excellent example of a similar effect arising from two different causes is given by the Stockholm and Upper North regions: both have almost equal shares in the age group above 65 years. The low proportion of elderly people in the Stockholm region is caused by in-migration which can be seen from the high proportion of persons of active ages. In the Upper North region a low pro-

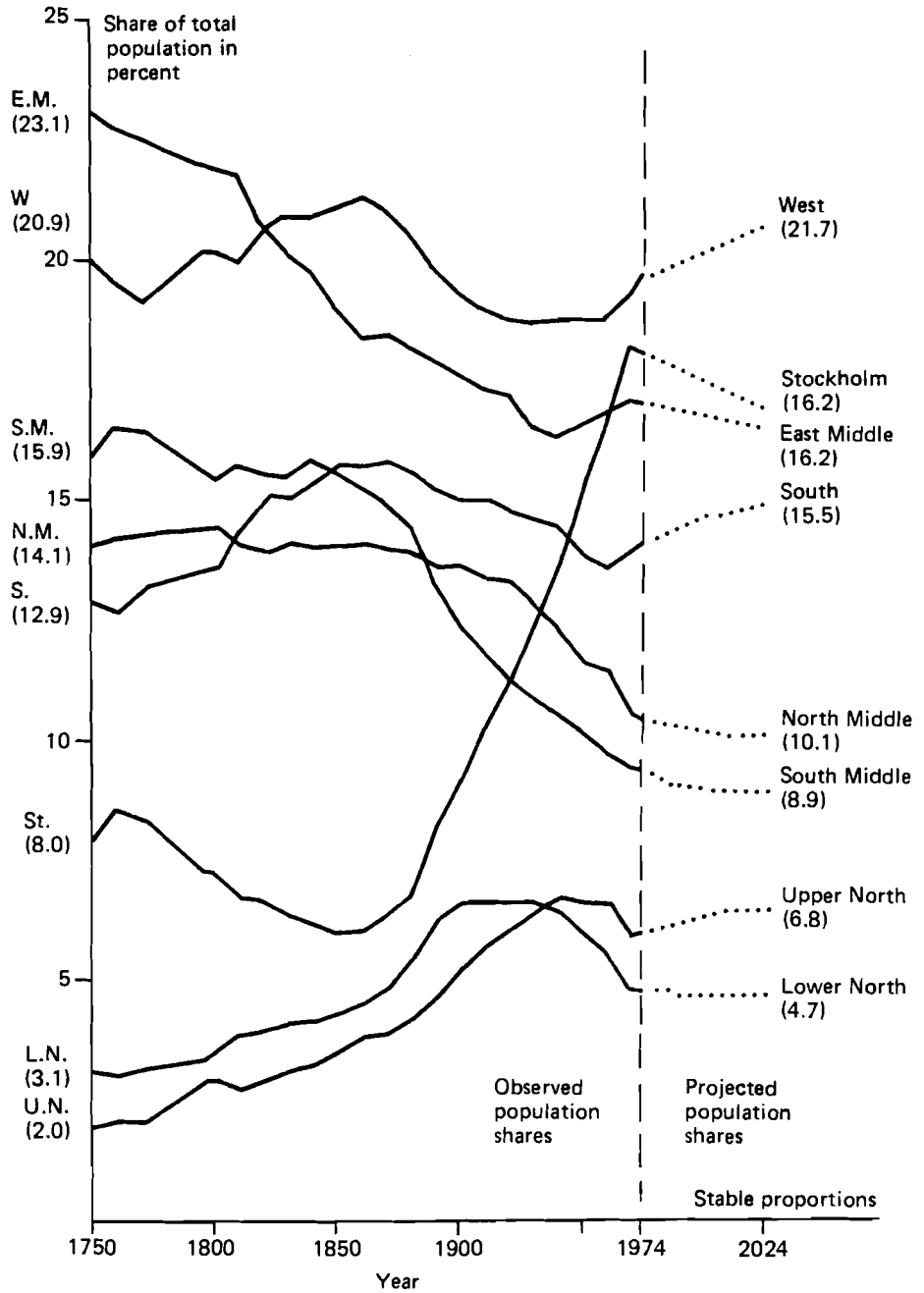


FIGURE 3.1 Regional population development in Sweden 1750–1974 and projection to 2024. Source: 1950–1974 see Figure 1.3; 1975–2024 according to applications of the model.

TABLE 3.10 The mean age of the total population by region; 1974 and 2024.

Region	1974	2024	Index <sup>a</sup>
Stockholm	36.8	41.3	112
East Middle	37.2	40.9	110
South Middle	38.1	41.3	108
South	38.0	41.7	110
West	37.6	40.9	109
North Middle	39.1	41.7	107
Lower North	39.2	41.9	107
Upper North	36.3	40.1	110
Total average	37.6	41.2	110

<sup>a</sup>1974 = 100.

TABLE 3.11 Projected age composition of total population by region; 1974, 2024, and at stability.

Region	1974			2024			Stable equivalent		
	0–14	15–64	65 +	0–14	15–64	65 +	0–14	15–64	65 +
Stockholm	20.4	66.9	12.7	16.2	65.1	18.7	16.4	65.1	18.5
East Middle	21.5	63.9	14.6	17.9	63.0	19.1	18.0	62.7	19.3
South Middle	21.1	62.8	16.1	18.1	61.9	20.0	18.1	61.5	20.4
South	20.4	64.1	15.5	17.1	62.6	20.3	17.0	62.0	21.0
West	21.0	64.1	14.9	17.7	63.3	19.0	17.5	62.6	19.9
North Middle	19.7	63.5	16.8	17.2	62.8	20.0	17.2	62.4	20.4
Lower North	19.6	63.6	16.8	17.2	62.8	20.0	17.2	62.5	20.3
Upper North	21.9	65.3	12.8	18.9	63.2	17.9	18.7	62.8	18.5
Total average	20.8	64.4	14.8	17.4	63.3	19.3	17.4	62.8	19.8

portion of elderly people is caused by a traditionally high fertility level, which is seen from the large share of ages below 15.

### 3.5 On Fluctuations in Swedish Demographic Behavior

It must be stressed that the projections reported in the preceding section are based on data for one single year – 1974. This year has not been chosen because it represents any typical set of parameters but rather as one recent year for which a complete set of statistics, useful for estimations of parameters for *illustrative* tests of the programs, is available.

TABLE 3.12 Trends in vital statistics; 1971–1977.

	1971	1974	1977
Total fertility rate	1.98	1.89	1.65
Infant mortality rate (per thousand live births)	11.1	9.6	8.1
Expectation of life at birth	M 72.0 F 77.3	72.2 77.8	72.4 78.5
Gross mobility between counties (per thousand inhabitants)	28.7	29.0	25.2

SOURCE: SOS Befolkingsförändringar. Del 3, 1971, 1974, 1977 (Population Changes. Part 3, 1971, 1974, 1977).

The instability of the relevant population statistics can be seen in Table 3.12. It is therefore dangerous to interpret the population projections presented as reasonable forecasts.

#### 4 REGIONAL POPULATION POLICIES IN SWEDEN

##### 4.1 *An Historical Outlook*

We stated earlier that comprehensive statistics, dating back to the eighteenth century, are available for most aspects of Swedish population development. One of the reasons why population statistics are available for such a long time period is the population debate that started in the mid-eighteenth century. The development of Swedish policies related to population size and structure can be subdivided into six historical stages (see Guteland *et al.* 1974).

- the age of mercantilism (1750–1860)
- the liberal period (1860–1913)
- the period of population control (1914–1934)
- the movement of social policies against the crises in the population issue (1935–1955)
- labor market policy (1955–1965)
- location policy (1965–1970)
- regional policy (1970–to the present)

In the mid-eighteenth century Sweden had a population of less than 1.8 million inhabitants. This meant that there were only slightly more than 4 inhabitants per square kilometer of total land area. As was shown in section 1.3

the population was very unevenly distributed at that time. Economists and politicians of the time held the mercantilist view that an increase in the population would increase the resources of the country. Such resources were assumed to have two major uses. They could either be used for the production of goods, preferably export goods, or as an asset in the armed forces. The role of population increase in providing more personnel for the military services was the major reason for the secrecy of the population censuses during the eighteenth century.

The mercantilist attitude was also reflected in the antimigration laws which were enforced until 1860. Quite consistently the authorities encouraged immigration, especially of specialist workers, for the newly created industries. Other policies were also launched during the eighteenth century with the explicit goal of favoring population growth.

The attitude to the population issue changed about the mid-nineteenth century. The former mercantilist orientation of population and economic policies was transformed into liberal-oriented industrial and migration laws. The formerly strict regulation of investment and establishment of firms was changed into a system on modern principles of free entry into and exit from the market. Population policies were also changed in a way consistent with the liberal principles of economic policies. Immigration and emigration laws and regulations were abolished and substituted with the principle of free exchange of people with other countries. Foreigners immigrating to Sweden required neither passports nor residence or work permits. This freedom of movement coincided with other factors that furthered the great emigration from Sweden to the United States over the period 1860–1914. During the peak decade (1881–1890) emigration amounted to approximately eight persons per thousand inhabitants. The liberal migration policy also implied a significant rise in immigration.

In the first decade of the twentieth century a reaction against migration emerged and both anti-emigration and anti-immigration policies were adopted. Passports were reintroduced in 1917 and a number of legal actions against labor mobility were introduced in the 1920s. The new legislation against population mobility was related to unemployment, the housing situation, law and order, and also, to some extent, to racial considerations.

The discussion on population development in terms of size and structure was completely changed with the publication in 1934 of *Crisis in the Population Issue* by Alva and Gunnar Myrdal. They pointed to the observed fast decrease in fertility and its relation to the social and economic situation of families in Sweden during the 1930s. A national Commission on Population was set up in 1935 to formulate and implement a new population policy. The first laws were related to health services for mothers and infants. The Commission on Population was followed by a second, and extended, Population Committee in 1941, when the population debate flared up again. The committee formulated a general population and social policy comprising guidelines on the subjects of abortion, housing subsidies, provision of school meals, and child allowances.

By the end of the 1940s the advent of modern population policies was due. From that time onward aspects of internal migration, and its relation to local labor markets, were stressed. Population and settlement policies became central aspects in the general economic policy of Sweden. These issues will be discussed in the final section of this report.

#### *4.2 From Efficiency-Oriented to Equity-Oriented Regional Population Policy*

No population policy in the classical demographic sense exists in Sweden today. As soon as that definition is widened it is no longer a true statement.

After the great population investigations during the 1930s and 1940s, the population debate gradually became oriented toward questions of regional population distribution, resource allocation, and equity. To begin with the only accepted measures to influence population development were those aimed at changing the regional distribution of the country's population by encouraging internal and external migration. The policy adopted was, to a large extent, inferred by economic policies at the macro level.

The development of the economic debate was influenced by the surprisingly fast growth of the European economy and its consequences in terms of booming exports from Sweden, local commodity scarcities, and inflation. The Keynesian policies, almost universally accepted at the end of World War II, were not developed for these kinds of political problems with their excessive demands for labor in some industries, unemployment in other industries, and a fast increase in wages and prices.

At the end of the 1940s a group of economists – mainly Bent Hansen, Erik Lundberg, and Gösta Rehn – became involved in a discussion of the conflict between national stabilization policy and structural unemployment. It was realized that a low level of recorded unemployment at the national level, coupled with an implied high rate of inflation, was normally accompanied by extensive unemployment in certain industrial sectors, occupations, and regions.

As early as 1950 two economists working within the Swedish Association of Trade Unions (LO) – Gösta Rehn and Rudolf Meidner – developed the theory of modern labor-market policy. Their scheme had the following theoretical structure:

- a centralized wage policy is working for an equalization of wages in the whole economy subject to constraints imposed by a maximum accepted increase in prices and a minimal rate of growth of the national product

The negotiated general increase in wages would be rather large, implying a sharply declining demand for labor in certain regions and sectors facing low pro-



ductivity, and/or low income elasticity of demand in the product market. The government could then act in two ways: it could subsidize the firms in order to prevent shutdowns, or it could increase the sectoral and regional mobility of those people in danger of becoming unemployed.

Actual policies during the period 1955–1965 show that mobility measures were favored politically, which means that the Meidner–Rehn recipe was never followed in only one of its aspects. Increased mobility of labor would be the means of avoiding unemployment in certain regions and excessive demand for labor in other regions, thus checking inflation and regional inequality. The reallocation of labor would also be a means of increasing the rate of economic growth in the economy as a whole.

The consequence of 10 years of subsidies to mobility was an immense migration from the lagging regions of the north to, primarily, the booming Stockholm metropolitan region. By the end of the 10-year period some political uneasiness with this migration process was emerging. The resistance to modern labor-market policy with its strong arguments and practical policies in favor of increasing internal migration was continuously growing into a decentralization movement. Catch-phrases such as “we won’t move” and AMS, the acronym for Arbetsmarknadsstyrelsen (Swedish Labor Market Board) representing, in this case, “All Must go South” were used in the public debate.

The politicians of Sweden reacted promptly to the growing criticism of the effective, modern labor-market policies of the decade 1955–1965. A new system for location policy was set up in 1965 explicitly to create jobs in northern Sweden. The policy was based on the notion that the manufacturing industry had to be expanded much more rapidly in order to absorb the unemployed labor from the forestry and farming sectors of that area. The Swedish parliament declared that the new location policy should aim at the relocation of industry so that:

- the supply of capital and manpower could be fully utilized and allocated in a way that supported rapid economic progress
- the rising prosperity could be distributed in such a way that people in various parts of the country would be offered satisfactory social and cultural services
- the structural development and economic expansion could take such forms and occur at such a pace that the security of individuals would be protected

The government accepted as inevitable the fact that the gradual decline in population of the most sparsely populated northern inland regions and the smaller localities would occur, irrespective of any governmental actions. The implication of this was that the location aid to northern Sweden should aim at expediting the growth of the already more developed localities.

The subsidies to capital were of two different kinds: *location loans* and *location grants*. According to the original stipulations subsidies could only be granted to projects:

- leading to continuing employment for the labor force
- having acceptable competitiveness in general
- in the regions providing advantages for economic activities

As a rule, the total support was limited to two-thirds of the total investment costs.

Newly created industries or industries that had enlarged their operations within regions where employment was scarce, were also able to obtain education support. However, the rules for this kind of support were very strictly regulated. The first 5 years of location support (1965–1970) were regarded as a trial period and location grants and loans were given only to industries within the “northern support area” comprising the four northernmost counties and sparsely populated parts of the counties in middle Sweden (Figure 4.1a). This was not an absolute rule, as support could, to some extent, be temporarily granted to industries in other parts of the country.

In connection with the evaluation of the regional support in 1970 the forms of support were enlarged and some additional favorable loans were added to the system. In addition to this an “inner-aid area” was spatially delimited (Figure 4.1b), although it had already been established in practice by the fact that investments there were granted at a much higher subsidy rate than in locations along the coastline of northern Sweden. The fairly strict conditions for obtaining location support were eased, to some extent, when the new regional support policy program was approved in 1970.

Although economic growth remained as a goal of a superior order to the regional goals, the change of methods seemed to reveal at least the difference in emphasis of national versus regional goals. Especially in the extremely sparsely populated inner-aid area, temporary employment gains or even partial maintenance of employment in contracting or stagnating firms or sectors became more acceptable from 1970 onward. The demand for increased aid, regardless of the consequences to the economic progress of the nation as a whole, influenced the formulation of regional policy goals toward an increased emphasis on equity aspects of regional aid, and a decreased emphasis of the possible loss of efficiency with respect to sectoral resource allocation. Location support could also be granted to semi-industrial activities and industrial services.

In 1973 the general aid area was further enlarged and a “grey zone” was established along the border of the general aid area (Figure 4.1c). The islands Öland and Gotland, in the Baltic Sea, were also included in the general aid area. The available support was increased to cover certain forms of wholesale, trade, and business services.

In addition to the general conditions for obtaining location support a new

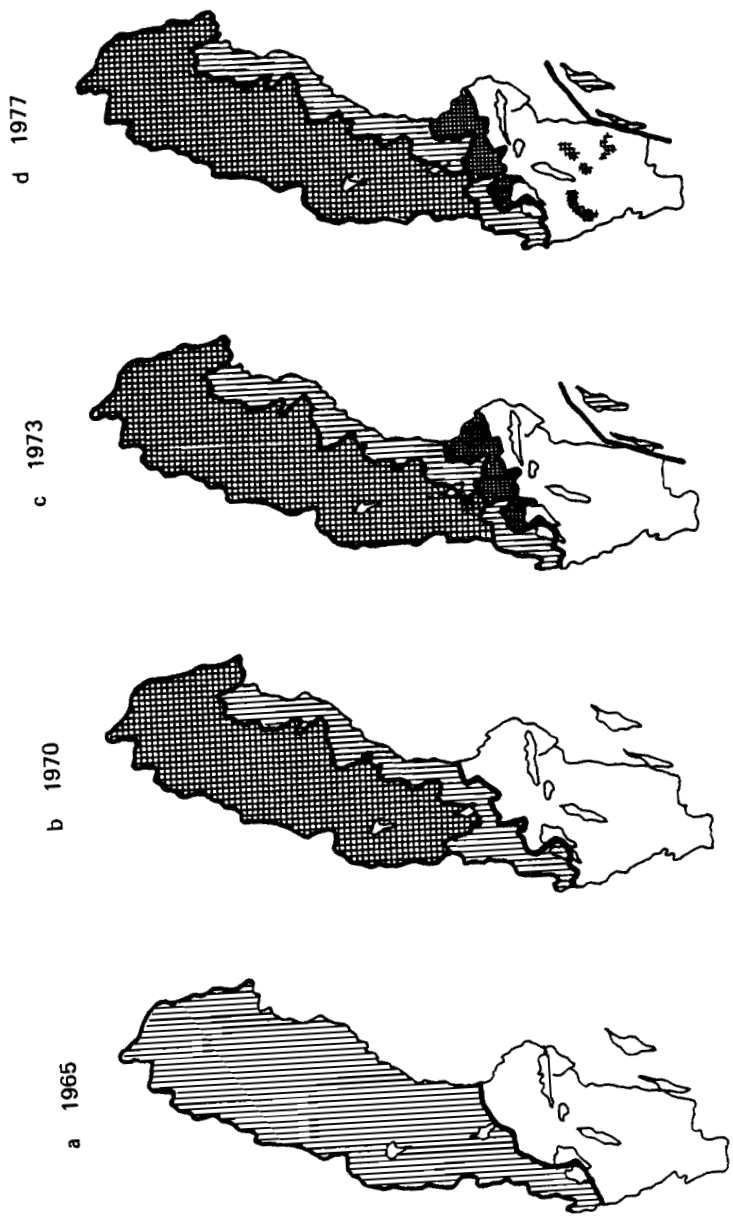


FIGURE 4.1 Boundaries of the aid areas, 1965–1977. Source: SOU 1978:47.

rule was introduced in 1974. The "sex-ratio rule" stipulated that at least 40 percent of the total number of jobs in a company receiving support should be reserved for either of the two sexes.

When the support system was revised in 1970 it was recognized that the inland sections of the aid area had severe problems, despite all actions taken to improve the situation. The depopulation in the younger age-groups of these areas was expected to lead to severe problems with respect to services for the remaining population. In order to support industries in this area further, a marginal employment subsidy was introduced. This type of subsidy was intended to stimulate companies to use labor to an increasing extent, as opposed to the location support which was a subsidy to capital.

The employment support was given in the form of a retrospective general premium to companies showing a net employment increase over a 3-year period. Newly established companies obtained the support for the total number of employees while firms that enlarged their business only received the support for the newly employed.

An impeding factor for economic development within the aid area was high transportation costs due to the long distances between the sellers and buyers. As a part of the location policy a transportation subsidy was introduced in 1971, in order to stimulate relocation of industries and to further a more even distribution of economic activity over the whole country. The transportation subsidy was designed to compensate firms in the supported part of the country for their distant position in comparison with firms in mid and south Sweden. For transportation distances exceeding 300 km firms in the northernmost part of the aid area could get between 15 and 35 percent of the transportation cost covered by subsidies and in the southern part of the aid area between 15 and 25 percent.

The development of these loans and grants over the first 10-year period (1965 –1975) is shown in Table 4.1 and the educational support for the same period is shown in Table 4.2.

Theoretical economists soon pointed to the potential inefficiency of subsidies to capital. If there were ample possibilities of substitution in the choice of production technique, it was then argued that the lowered price of capital, relative to labor, would lead to excessive mechanization of production in industry. Investment subsidies would thus have a tendency to lead to a higher capital intensity (capital per person employed) in areas where labor was abundant and capital scarce. It was argued that a marginal subsidy to employment of labor in disadvantaged (peripheral) regions would be more efficient in this respect. Reducing the price of labor to the companies would automatically create an inducement to keep the amount of labor, per unit of capital, high in the regions of high unemployment. It was also argued that such a policy would be more efficient as a means of reducing cost inflation.

The main goal of modern labor-market policy has been to achieve equality of wages and employment opportunities in different regions. The different

TABLE 4.1 Location aid to industrial companies, July 1965–June 1975. (1,000s of Swedish kronor).

Region	No. of enterprises	Estimated investment	Approved aid	Estimates by aided firms of employment increase	Actual increase Dec. 1974
Stockholm	—	—	—	—	—
East Middle	65	450.4	205.4	2,259	2,686
South Middle	61	265.1	172.9	2,267	2,417
South	16	95.8	58.0	1,394	1,585
West	106	454.3	237.7	4,137	4,317
North Middle	430	1,783.9	1,034.3	11,437	10,849
Lower North	222	1,235.0	732.2	6,524	5,564
Upper North	282	1,825.2	876.5	6,950	7,749
<b>Total</b>	<b>1,182</b>	<b>6,109.7</b>	<b>3,302.3</b>	<b>34,968</b>	<b>35,167</b>
In aid area	949	4,761.2	2,618.8	25,232	24,161

SOURCE: Calculated from "Regionalpolitiska studier" Arbetsmarknadsdepartementet Ds A 1975:12 (Studies in regional policy. Labor Market Department).

TABLE 4.2 Appropriated educational support, July 1965–June 1975 (1,000s of Swedish kronor).

Region	No. of enterprises	Total support	No. of employees
Stockholm	—	—	—
East Middle	24	9,242	1,780
South Middle	131	17,064	2,308
South	17	14,801	2,201
West	88	36,539	3,922
North Middle	759	84,036	11,525
Lower North	751	100,816	9,005
Upper North	1,259	139,553	13,050
<b>Total</b>	<b>3,029</b>	<b>402,051</b>	<b>43,791</b>

SOURCE: Calculated from "Regionalpolitiska studier" Arbetsmarknadsdepartementet Ds A 1975:12 (Studies in regional policy. Labor Market Department).

regions, however, have unequal accessibility and unequal stocks of capital. This means that regions with a high level of accessibility and large stocks of capital normally have a high, marginal productivity of labor and a better capacity to pay wages at all levels of employment than do the more remote regions, which also often lack capital. It is obvious that a marginal employment subsidy to

the companies working in disadvantaged regions could attain the two goals simultaneously. The main advantage of the employment subsidy scheme is its rapid effect in comparison with subsidies to capital, which have to work through a necessarily slow investment process. Investment subsidies also tend to have a limited effect on employment because of the lowered price of capital, which in many cases induces firms to overmechanize. The Swedish forestry industries in regions of high unemployment are prime examples of subsidization which has led to excessive mechanization and severe unemployment among all workers specialized in the old, more labor-intensive techniques.

The transformation of the first period of location policy into a system of more generally oriented regional policy, at the beginning of the 1970s, may partly be seen as an answer to this kind of criticism. The early experiments with location policy had been too narrow in scope and too limited in their extension to regions and industries. The restriction of the goal formulation to economic efficiency became even less pronounced in 1972 when the parliament, for the first time, approved a plan for the regional structure. The goals of the regional policy after 1970 may be summarized in the following three main categories:

- the distribution and utilization of production resources in various regions and industries
- the distribution of welfare over different population groups
- stabilization policies

The plan for regional structure may be seen as an instrument for achieving a more even distribution of population and resources in various parts of the country. The idea behind the plan was to create growth poles in each of the 24 counties and to encourage the establishment of an urban system which could be relatively robust with respect to external changes. The relocation of governmental bodies is a contribution to such a development.

The broad spectrum of economic problems implied a classification of each center of the country within one of the following four functional categories:

- metropolitan areas (3)
- primary centers (23)
- regional centers (76)
- municipal centers (114)

In short, the medium-term regional problem was defined in terms of the problems of the main regional centers. Regional economic policy should, according to the government proposition, gradually be developed to meet the need for structural redevelopment of the main center of each region.

The problem of the *metropolitan areas* was considered to be excessively rapid expansion, leading to congestion, air pollution, noise, and other environmental problems. A too-rapid decline of manufacturing was also thought to

create problems for the older age groups in the labor-market. On the whole, though, the labor-market situation was considered to be close to the ideal. Political means should be used only to curb the growth of these areas.

*Primary centers* were considered to have most of the advantages of the metropolitan areas except for the wide range of choices in the labor market. In order to develop these centers, and consequently their hinterlands, economic activities should be so located as to increase the demand for skilled labor and to increase the possibilities for female participation in the labor market. The relocation of central government activities was directed to these centers as a first step in this direction. The primary centers and their hinterlands were to be the main receivers of the migrants who would otherwise go to the metropolitan areas.

It was also decided that the central administrative units of manufacturing industry could receive location aid if they decided to move to a primary center.

*Regional centers* were defined as commuting centers providing public and private services for a number of municipalities. Although such regional services are usually well developed, and although the regional centers perform these functions with sufficient efficiency, their potential as focal points of the labor markets surrounding them is often insufficiently developed. It is to be expected that these centers – especially those in the north – will receive most of the future location aid to investment.

*Municipal centers* are lowest in the hierarchy. Most of them are located in the vicinity of regional centers and do not play any significant role in the labor market of their respective regions. These centers will not be of any interest for regional policy at the national level. Some of the municipal centers in the forest areas (mainly in the north) are, however, the only centers of any kind in the entire region. Regions of this type are rapidly declining in population and suffer from severe unemployment, low income, and other structural problems. The government has decided to use a variety of instruments with immediate effects in these cases, but with very moderate expectations of success concerning the general goals of regional policy. Recently these regions were given the right to use employment subsidies for manufacturing as direct location subsidies to local service facilities. A major part of the subsidies to local government is also directed to these regions. However, most of them seem to be regarded as “lost” by the central authorities, and their medium- and long-term problems are mainly handled with short-term means to alleviate the most pressing problems of the labor market.

The government has also declared that regional policy should not aim at long-term solutions for the problems in the metropolitan areas or in the areas with administrative centers of the highest order. A recent official publication on regional policy concluded that the intention is to concentrate a major part of public investment on and, to a large extent, measures for location aid to the places that have been designated primary centers and regional centers.

The regional distribution of location aid can also be described with reference to the growth-center policy introduced in the 1970s, Table 4.3.

TABLE 4.3 Location aid distributed between different centers belonging to different functional categories.

Functional category	Percentage of population, 1975	Percentage of total location aid, 1965–1975
Metropolitan areas	31.9	1.0
Primary centers	27.8	36.2
Regional centers	24.4	37.5
Municipal centers	15.8	25.3
Total	100	100

SOURCE: SOU 1978:47.

#### 4.3 *Evaluation of Regional Policy Effects*

The effect of regional policy on economic and social development in the country may be evaluated from different viewpoints for example:

- changes in employment situation
- changes in economic efficiency
- changes in population growth and distribution

The effects on employment within manufacturing industries have been estimated as an increase of 15,000–20,000 jobs for the total aid area. The largest employment effects have been attained within those areas that were given the highest priority. Furthermore, analyses of effects before and after 1970 show that the efficiency of the support system seems to have declined after this year. A reasonable explanation seems to be that the measures that were added to the location policy in 1970 and later had not only a less pronounced effect on economic growth but also on employment.

The general aid area had, in 1965, an unfavorable industrial composition since a large proportion of the labor force was employed in industries based on raw materials. During the 1965–1975 period this type of industry, being exposed to external competition, had to meet a slower growth in domestic consumption; also, the effects of foreign competition were felt more strongly by the raw-material based industries than by those producing finished goods.

The change in industrial structure was rapid in the aid area and followed the same pattern as in the country as a whole. While the reason behind the change in other parts of the country was changing international competitiveness trends and a redistribution of consumption within the country, it could have been the regional policy that reinforced changes in the aid area. A detailed analysis of the technical choice question for the aid area shows that those firms that had obtained location grants and employment grants reduced their



firms that had obtained location grants and employment grants reduced their specialization on capital-intensive production. There is thus no currently available empirical basis for the argument that the choice between capital and wage subsidies has, in any decisive way, induced the firms to choose products according to their capital intensity. On the contrary, the choice of support projects and changes in comparative advantages in the country have governed the development of specialization of firms obtaining location aid.

The evaluation of the consequences of regional policies on the efficiency of manufacturing industry has been rather negative: "Results on this point . . . indicate that the subsidy part of regional policies has had a less effective orientation in the 1970s with respect both to the employment goal and the goal of low costs, as measured by reduced economic growth."\*

It has been argued that there has been a reversal in migration flows as a consequence of locational regional policies during the period from 1965. It is evident that population development during the 1970s can be regarded as more balanced than during the 1960s. The (gross) interregional migration is still very high and the population of the inner-aid area continues to decline, although at a much slower rate than during the 1960s. The stable pattern of internal migration over a very long period with a net in-migration to the metropolitan areas and a net out-migration from the inland counties has been reversed from 1970 onward. The migration gains for the metropolitan areas have turned into migration losses and the migration stream has been directed primarily to growth centers in northern Sweden.

It is, however, obvious that the stagnation and decline of certain metropolitan regions coincides with the emergence of new business-cycle patterns and slow-growth patterns in the world economy. It can thus also be argued that the current stagnation or decline of metropolitan areas is such a worldwide phenomenon that it can not be attributed to policies tried in a small set of countries. These phenomena are of major significance for the understanding of current regional population movements and ought to be the subject of extensive research to investigate the interactions between macroeconomic and demographic factors.

## 5 CONCLUSIONS

Sweden is on the whole a sparsely populated country with approximately 20 inhabitants per square kilometer. Its population is also growing at a very slow rate (3.12 percent per year since 1945). The general level of fertility is low (1.89 in 1974) and declining. The under-15 age group comprises approximately 20 percent of the total population. With current fertility, mortality, and migration patterns, this share will converge to a stable equivalent of less than 17 percent. Current demographic parameters suggest a further development toward a society with a very high proportion of elderly people, and with problems of health and

\*SOU 1978:4, p. 135.

social care for which Swedish institutions are not well adapted.

Regional population analysis and projections indicate that it is more important to analyze differential migration patterns than regional variations in fertility and mortality. Our study shows that the coefficients of regional variation of fertility and mortality have been declining until recent periods and seem to have stagnated at approximately 5 percent. Some interesting regional variations of fertility and mortality still exist, but these are smoothed away at the level of aggregation used in these projections.

Patterns of migration are much more unstable and thus more vital to Swedish population analysis, projection, and policies. The high rate of urbanization following a fast economic expansion in the 1950s and 1960s led to an increase of the Stockholm region's share of the population from 16.3 percent in 1950 to 18.6 percent in 1970. The migration pattern of the 1970s has reversed this trend. If the 1974 migration pattern is projected into the future, it suggests an eventual return to a share for Stockholm of slightly above 16 percent of the national population.

The importance of interregional migration for population projections is one of the main reasons why Swedish population policies, after 1950, are almost identical with regional economic policies.

Until 1965, Swedish regional policies were oriented to a *stimulation* of interregional migration. Subsidies were used extensively to reduce constraints on intersectoral, interoccupational, and interregional mobility in order to move the working population away from economic activities with declining demand or productivity. The effects of this policy would be, according to the analysis of the early 1950s, reduced inflationary pressures, a faster rate of growth, and a faster adaption of the industrial structure to the long-term pattern of demand. The consequence of these policies for the regional population structure was fatal for some sparsely populated areas. Population in some cases declined below important service and employment thresholds. A new policy of subsidies to provide capital for regions of decline was introduced in 1965. These schemes were broadened in the 1970s with employment subsidies, relocation of government institutions, and education grants, etc. The pattern of regional population development also changed after 1970. It is, however, too early to attribute these changes to regional policies alone. The international decline of growth rates and general demand for labor in the 1970s may have contributed to the stagnation and possible decline of metropolitan areas. It is thus premature to estimate the relative importance of regional policies for Swedish regional population development.

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## **APPENDIXES**



*Appendix A*

**OBSERVED POPULATION, AND NUMBERS OF BIRTHS, DEATHS,  
AND MIGRANTS BY SEX, AGE, AND REGION, 1974**

- A1 Males
- A2 Females
- A3 Total

region		stockh.		deaths		migration from stockh. to		west n.-midl l.-north up-north			
populatio		births		stockh. east-mid south		stockh. east-mid south		west n.-midl l.-north up-north			
-----		-----		-----		-----		-----			
0	53372.	0.	98.	0.	684.	188.	173.	205.	345.	181.	175.
5	53243.	0.	15.	0.	457.	180.	152.	130.	188.	116.	111.
10	48549.	1.	19.	0.	247.	87.	89.	82.	113.	70.	33.
15	45796.	484.	21.	0.	238.	71.	117.	78.	100.	58.	56.
20	52442.	2735.	39.	0.	672.	151.	232.	260.	251.	186.	195.
25	71523.	4505.	70.	0.	994.	243.	307.	360.	465.	259.	304.
30	62609.	2317.	86.	0.	558.	146.	209.	189.	279.	161.	162.
35	46287.	575.	79.	0.	351.	85.	106.	92.	141.	82.	69.
40	40818.	113.	137.	0.	211.	64.	73.	69.	98.	61.	31.
45	43084.	9.	227.	0.	169.	44.	60.	49.	80.	40.	31.
50	48941.	0.	324.	0.	152.	37.	61.	49.	75.	33.	19.
55	41906.	0.	523.	0.	120.	33.	44.	26.	62.	38.	8.
60	38803.	0.	781.	0.	118.	46.	69.	29.	86.	33.	11.
65	29755.	0.	958.	0.	101.	28.	50.	28.	76.	21.	10.
70	20338.	0.	1096.	0.	32.	13.	18.	11.	18.	8.	3.
75	12507.	0.	1068.	0.	14.	7.	6.	6.	10.	6.	0.
80	6713.	0.	943.	0.	9.	7.	7.	3.	5.	2.	0.
85	3537.	0.	847.	0.	0.	0.	0.	0.	0.	0.	0.
total	720283.	10739.	7391.	0.	5127.	1393.	1773.	1656.	2392.	1315.	1224.
region east-mid											
-----											
0	50611.	0.	119.	0.	802.	193.	169.	250.	336.	114.	128.
5	54715.	0.	19.	0.	298.	125.	123.	201.	235.	84.	109.
10	48980.	0.	10.	0.	171.	74.	74.	112.	121.	45.	55.
15	47294.	649.	32.	0.	332.	84.	112.	137.	151.	35.	50.
20	50110.	3050.	49.	0.	968.	221.	233.	401.	383.	110.	154.
25	60458.	3844.	66.	0.	934.	307.	269.	460.	512.	170.	194.
30	50966.	1893.	67.	0.	454.	171.	140.	248.	274.	98.	127.
35	39959.	494.	72.	0.	247.	86.	96.	134.	163.	47.	68.
40	36886.	96.	99.	0.	153.	52.	54.	105.	100.	34.	34.
45	39370.	6.	175.	0.	115.	46.	49.	62.	68.	23.	23.
50	44496.	0.	289.	0.	108.	33.	33.	38.	70.	19.	18.
55	40885.	0.	391.	0.	64.	21.	22.	22.	63.	20.	12.
60	40362.	0.	677.	0.	42.	29.	45.	38.	47.	17.	15.
65	34405.	0.	1012.	0.	56.	21.	29.	30.	56.	7.	6.
70	26325.	0.	1258.	0.	25.	14.	10.	5.	19.	1.	3.
75	17079.	0.	1433.	0.	20.	4.	3.	7.	6.	1.	4.
80	9254.	0.	1265.	0.	7.	1.	3.	3.	7.	0.	1.
85	4990.	0.	1209.	0.	0.	0.	0.	0.	0.	0.	0.
total	697155.	10032.	8242.	0.	4392.	1507.	1464.	2263.	2611.	825.	1002.



region		sout-mid									
age	population	births	deaths	migration from sout-mid to				west	n.-middl	l.-north	up-north
				stockh.	east-mid	sout-mid	south				
0	26850.	0.	83.	94.	165.	0.	193.	204.	54.	17.	28.
5	29260.	0.	10.	79.	123.	0.	103.	144.	41.	4.	20.
10	26719.	1.	8.	54.	63.	0.	95.	69.	18.	8.	5.
15	26947.	309.	34.	93.	117.	0.	140.	133.	20.	7.	14.
20	27368.	1639.	34.	334.	321.	0.	396.	344.	61.	21.	35.
25	29532.	2016.	27.	230.	291.	0.	314.	358.	63.	36.	45.
30	24948.	924.	31.	100.	124.	0.	161.	165.	42.	15.	20.
35	21043.	310.	33.	50.	66.	0.	108.	103.	20.	3.	11.
40	20484.	74.	48.	34.	40.	0.	83.	68.	19.	3.	11.
45	22040.	2.	75.	37.	41.	0.	49.	43.	10.	2.	9.
50	24747.	0.	133.	19.	28.	0.	44.	34.	10.	4.	8.
55	23442.	0.	232.	12.	24.	0.	30.	31.	2.	2.	3.
60	24058.	0.	378.	14.	20.	0.	24.	20.	7.	0.	3.
65	20710.	0.	538.	9.	16.	0.	24.	27.	9.	2.	0.
70	16140.	0.	722.	6.	15.	0.	18.	10.	4.	1.	1.
75	10793.	0.	781.	3.	5.	0.	8.	3.	1.	1.	0.
80	5827.	0.	699.	3.	1.	0.	4.	3.	1.	1.	0.
85	3483.	0.	810.	0.	0.	0.	0.	0.	0.	0.	0.
total	384391.	5275.	4676.	1171.	1460.	0.	1802.	1759.	382.	127.	213.

region		south									
age	population	births	deaths	migration from south to				west	n.-middl	l.-north	up-north
				stockh.	east-mid	sout-mid	south				
0	39665.	0.	82.	140.	130.	197.	0.	224.	67.	21.	44.
5	42953.	0.	12.	114.	91.	119.	0.	111.	39.	21.	27.
10	38543.	0.	7.	55.	41.	93.	0.	65.	21.	13.	5.
15	37749.	399.	24.	121.	102.	101.	0.	120.	22.	13.	19.
20	41054.	2253.	49.	295.	208.	305.	0.	275.	67.	36.	34.
25	48070.	3221.	52.	320.	241.	315.	0.	427.	101.	27.	65.
30	42010.	1562.	51.	155.	114.	184.	0.	197.	49.	25.	40.
35	34251.	437.	63.	86.	65.	100.	0.	108.	26.	13.	17.
40	32260.	79.	77.	54.	39.	40.	0.	60.	16.	11.	10.
45	34039.	6.	119.	36.	33.	44.	0.	39.	20.	6.	6.
50	37104.	0.	242.	38.	19.	43.	0.	35.	11.	3.	3.
55	33486.	0.	333.	21.	19.	23.	0.	26.	4.	2.	4.
60	33768.	0.	559.	13.	17.	24.	0.	30.	3.	1.	3.
65	29180.	0.	796.	11.	13.	18.	0.	17.	4.	1.	0.
70	21616.	0.	971.	4.	10.	11.	0.	6.	4.	1.	0.
75	14243.	0.	1086.	7.	3.	8.	0.	3.	4.	1.	0.
80	7905.	0.	945.	6.	3.	3.	0.	3.	0.	1.	0.
85	4953.	0.	1160.	0.	0.	0.	0.	0.	0.	0.	0.
total	572849.	7957.	6628.	1476.	1148.	1628.	0.	1746.	458.	196.	277.

Region		west		north		east		south		west		north		east		south	
age population	births	age population	births	age population	births	age population	births	age population	births	age population	births	age population	births	age population	births	age population	births
0	57360	0	146	0	143	0	215	0	183	0	192	0	183	0	131	0	192
5	60851	0	23	0	107	0	145	0	131	0	131	0	131	0	131	0	131
10	54745	0	19	0	85	0	82	0	82	0	82	0	82	0	82	0	82
15	53983	602	41	113	109	113	109	131	131	131	131	131	131	131	131	131	131
20	58074	3356	60	336	341	335	335	335	335	335	335	335	335	335	335	335	335
25	68274	4486	64	331	355	355	355	298	298	298	298	298	298	298	298	298	298
30	57491	2054	90	187	212	160	199	160	199	160	199	160	199	160	199	160	199
35	46610	638	76	97	114	73	122	73	122	73	122	73	122	73	122	73	122
40	44080	123	126	71	52	44	88	44	88	44	88	44	88	44	88	44	88
45	47057	5	183	58	41	41	51	41	51	41	51	41	51	41	51	41	51
50	52719	0	364	28	37	40	53	37	53	37	53	37	53	37	53	37	53
55	46998	0	433	16	29	23	38	23	38	23	38	23	38	23	38	23	38
60	46615	0	750	18	19	24	41	24	41	24	41	24	41	24	41	24	41
65	39605	0	1055	15	27	21	42	21	42	21	42	21	42	21	42	21	42
70	29952	0	1380	7	7	9	22	9	22	9	22	9	22	9	22	9	22
75	20127	0	1489	4	7	2	5	2	5	2	5	2	5	2	5	2	5
80	10859	0	1365	3	3	4	3	4	3	4	3	4	3	4	3	4	3
85	5464	0	1455	0	0	0	0	0	0	0	0	0	0	0	0	0	0
total	801346	11264	9119	1619	1789	1475	1833	1475	1833	1475	1833	1475	1833	1475	1833	1475	1833
-----																	
Region		north		west		east		south		west		north		east		south	
age population	births	age population	births	age population	births	age population	births	age population	births	age population	births	age population	births	age population	births	age population	births
0	26618	0	68	0	124	0	240	0	36	0	38	0	129	0	73	0	67
5	30587	0	10	0	96	0	152	0	36	0	36	0	89	0	55	0	44
10	29268	0	14	0	105	0	168	0	13	0	13	0	57	0	29	0	22
15	29730	373	28	150	150	150	168	46	46	46	46	46	92	0	37	0	19
20	30294	16974	34	463	500	463	30	67	54	256	256	256	97	0	113	0	67
25	32831	1911	45	355	462	355	64	54	54	256	256	256	97	0	97	0	96
30	27013	935	48	127	200	127	31	40	40	129	129	129	64	0	64	0	57
35	22981	257	43	79	110	79	26	23	23	67	67	67	32	0	32	0	31
40	23661	61	67	45	62	45	15	17	14	44	44	44	25	0	25	0	14
45	25618	5	119	47	65	47	13	12	12	35	35	35	17	0	17	0	12
50	29785	0	199	44	55	44	7	15	15	28	28	28	14	0	14	0	12
55	27369	0	306	19	37	19	6	6	6	20	20	20	14	0	14	0	7
60	24497	0	465	17	27	17	12	14	14	20	20	20	19	0	19	0	4
65	24497	0	711	18	32	18	5	6	6	19	19	19	6	0	6	0	2
70	18756	0	933	15	15	15	3	3	3	11	11	11	4	0	4	0	2
75	12571	0	1055	2	4	2	0	0	0	7	7	7	4	0	4	0	0
80	6511	0	884	4	4	4	2	0	0	0	0	0	0	0	0	0	1
85	3364	0	849	0	0	0	0	0	0	0	0	0	0	0	0	0	0
total	429144	3364	5278	1650	2238	323	387	1299	387	1299	387	1299	603	0	603	0	457

region l.-north		age population		births		deaths		migration from l.-north to		stockh.		west h.-middl l.-north up-north		
age	population	births	deaths	stockh.	east-mid	south-mid	south	west h.-middl	l.-north	up-north	stockh.	west h.-middl	l.-north	up-north
0	12340.	0.	31.	80.	65.	14.	21.	28.	67.	0.	71.	0.	71.	0.
5	14277.	0.	8.	56.	35.	5.	15.	26.	43.	0.	46.	0.	46.	0.
10	13387.	0.	2.	30.	33.	7.	8.	16.	19.	0.	24.	0.	24.	0.
15	14213.	164.	17.	102.	53.	28.	25.	32.	45.	0.	29.	0.	29.	0.
20	19340.	723.	16.	308.	178.	49.	46.	104.	111.	0.	104.	0.	104.	0.
25	15084.	868.	14.	192.	132.	20.	46.	63.	83.	0.	151.	0.	151.	0.
30	12673.	471.	18.	67.	73.	16.	21.	36.	47.	0.	81.	0.	81.	0.
35	10959.	142.	27.	43.	26.	6.	8.	24.	26.	0.	36.	0.	36.	0.
40	11080.	38.	35.	31.	20.	6.	11.	13.	21.	0.	22.	0.	22.	0.
45	12269.	0.	59.	18.	15.	0.	4.	12.	15.	0.	15.	0.	15.	0.
50	13956.	0.	95.	16.	12.	0.	7.	7.	15.	0.	10.	0.	10.	0.
55	12973.	0.	131.	22.	5.	1.	7.	6.	11.	0.	6.	0.	6.	0.
60	13181.	0.	221.	13.	8.	2.	4.	8.	13.	0.	9.	0.	9.	0.
65	11504.	0.	349.	16.	10.	2.	4.	3.	13.	0.	2.	0.	2.	0.
70	8962.	0.	420.	10.	6.	0.	2.	0.	4.	0.	4.	0.	4.	0.
75	5931.	0.	522.	0.	3.	1.	0.	0.	0.	0.	1.	0.	1.	0.
80	3225.	0.	408.	2.	0.	0.	0.	0.	2.	0.	0.	0.	0.	0.
85	1724.	0.	424.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
total	202094.	2407.	2802.	1006.	674.	144.	229.	378.	532.	0.	617.	0.	617.	0.

region up-north		age population		births		deaths		migration from up-north to		stockh.		west h.-middl l.-north up-north		
age	population	births	deaths	stockh.	east-mid	south-mid	south	west h.-middl	l.-north	up-north	stockh.	west h.-middl	l.-north	up-north
0	17287.	0.	42.	73.	84.	25.	19.	48.	45.	67.	0.	45.	67.	0.
5	10398.	0.	3.	42.	54.	10.	14.	20.	15.	43.	0.	15.	43.	0.
10	18791.	0.	9.	24.	35.	18.	12.	23.	15.	31.	0.	15.	31.	0.
15	19455.	237.	20.	110.	66.	11.	17.	53.	28.	24.	0.	28.	24.	0.
20	19344.	1071.	20.	334.	203.	25.	50.	116.	74.	122.	0.	74.	122.	0.
25	20331.	1334.	22.	176.	155.	31.	47.	97.	82.	120.	0.	82.	120.	0.
30	16833.	703.	25.	80.	80.	25.	20.	48.	55.	51.	0.	55.	51.	0.
35	12029.	208.	24.	53.	38.	6.	16.	21.	26.	21.	0.	26.	21.	0.
40	14994.	32.	42.	25.	38.	9.	9.	13.	14.	33.	0.	14.	33.	0.
45	12294.	3.	110.	20.	16.	5.	10.	10.	10.	20.	0.	10.	20.	0.
50	16106.	0.	153.	10.	7.	4.	7.	11.	13.	14.	0.	13.	14.	0.
55	14166.	0.	213.	10.	15.	5.	4.	4.	10.	15.	0.	10.	15.	0.
60	11224.	0.	382.	12.	15.	3.	2.	5.	13.	13.	0.	13.	13.	0.
65	13221.	0.	450.	4.	2.	4.	2.	6.	5.	10.	0.	5.	10.	0.
70	8666.	0.	466.	2.	1.	0.	1.	2.	0.	4.	0.	0.	4.	0.
75	5464.	0.	366.	1.	0.	0.	0.	1.	3.	0.	0.	0.	3.	0.
80	2614.	0.	325.	0.	0.	0.	0.	0.	0.	2.	0.	0.	2.	0.
85	1340.	0.	2706.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
total	251868.	3592.	2706.	978.	828.	180.	232.	478.	386.	602.	0.	386.	602.	0.

## APPENDIX A2 Females.

region		stockh.									
-----											
age	population	births	deaths	migration from stockh.			to				
				stockh.	east-mid	sout-mid	south	west n.-middl	l.-north	up-north	
0	56749.	0.	91.	0.	672.	142.	170.	177.	312.	175.	150.
5	51015.	0.	12.	0.	463.	121.	115.	127.	209.	114.	100.
10	46053.	2.	8.	0.	229.	66.	87.	83.	121.	85.	43.
15	44810.	434.	18.	0.	339.	119.	133.	122.	165.	108.	97.
20	56064.	2586.	23.	0.	840.	203.	228.	278.	399.	210.	284.
25	71893.	4185.	33.	0.	903.	216.	285.	320.	453.	263.	237.
30	58211.	2148.	50.	0.	509.	125.	163.	162.	219.	106.	109.
35	43329.	532.	53.	0.	242.	68.	105.	85.	105.	73.	59.
40	40308.	97.	76.	0.	143.	45.	55.	54.	64.	48.	22.
45	44404.	7.	117.	0.	152.	51.	55.	51.	67.	34.	15.
50	51817.	0.	183.	0.	139.	29.	47.	43.	76.	33.	13.
55	45810.	0.	288.	0.	122.	34.	91.	39.	50.	24.	13.
60	45551.	0.	384.	0.	147.	43.	66.	50.	77.	32.	11.
65	39868.	0.	581.	0.	87.	37.	44.	26.	65.	14.	16.
70	31139.	0.	826.	0.	48.	16.	19.	22.	26.	11.	6.
75	22509.	0.	1071.	0.	38.	13.	13.	10.	12.	9.	3.
80	14353.	0.	1234.	0.	26.	7.	9.	5.	12.	5.	2.
85	8797.	0.	1591.	0.	0.	0.	0.	0.	0.	0.	0.
total	772680.	9991.	6639.	0.	5099.	1335.	1685.	1654.	2432.	1344.	1180.

region		east-mid									
-----											
age	population	births	deaths	migration from east-mid to			south				
				stockh.	east-mid	sout-mid	south	west n.-middl	l.-north	up-north	
0	53199.	0.	87.	412.	0.	178.	162.	264.	343.	114.	146.
5	52027.	0.	18.	315.	0.	135.	115.	156.	205.	77.	100.
10	46508.	0.	6.	186.	0.	62.	77.	102.	131.	31.	50.
15	44881.	604.	21.	566.	0.	151.	122.	199.	268.	58.	60.
20	48960.	3007.	18.	1090.	0.	311.	280.	519.	482.	152.	186.
25	57725.	3737.	27.	784.	0.	246.	236.	389.	441.	160.	198.
30	47702.	1659.	24.	341.	0.	132.	104.	189.	206.	75.	75.
35	38044.	423.	39.	172.	0.	58.	82.	97.	122.	38.	49.
40	36706.	49.	55.	111.	0.	41.	53.	67.	83.	26.	31.
45	39758.	7.	95.	115.	0.	37.	48.	62.	60.	14.	15.
50	45443.	0.	143.	84.	0.	36.	37.	39.	63.	26.	13.
55	41435.	0.	234.	72.	0.	28.	37.	43.	58.	11.	11.
60	41100.	0.	368.	76.	0.	28.	25.	43.	58.	15.	16.
65	37156.	0.	575.	68.	0.	28.	21.	20.	33.	5.	10.
70	31181.	0.	874.	42.	0.	15.	12.	16.	20.	6.	2.
75	22152.	0.	1172.	29.	0.	7.	7.	11.	7.	2.	5.
80	13588.	0.	1237.	14.	0.	5.	3.	5.	14.	0.	1.
85	7851.	0.	1534.	0.	0.	0.	0.	0.	0.	0.	0.
total	705316.	9526.	6527.	4477.	0.	1498.	1421.	2221.	2594.	810.	968.

region		sout-mid									
-----											
age	population	births	deaths	migration from sout-mid to				west	n.-middl	l.-north	up-north
				stockh.	east-mid	sout-mid	south				
0	28376.	0.	61.	106.	158.	0.	157.	221.	42.	19.	28.
5	27485.	0.	8.	73.	123.	0.	125.	138.	37.	6.	13.
10	25303.	0.	5.	51.	49.	0.	79.	81.	14.	2.	14.
15	25619.	283.	10.	174.	187.	0.	248.	211.	29.	9.	15.
20	25363.	1477.	10.	283.	387.	0.	462.	476.	80.	34.	42.
25	27387.	1887.	14.	184.	231.	0.	251.	289.	44.	18.	33.
30	23321.	912.	14.	72.	117.	0.	125.	142.	32.	5.	22.
35	20600.	250.	18.	46.	47.	0.	87.	73.	16.	4.	11.
40	20723.	87.	27.	36.	41.	0.	71.	52.	12.	0.	3.
45	22015.	3.	41.	27.	34.	0.	42.	40.	11.	5.	7.
50	24412.	0.	77.	22.	27.	0.	39.	25.	10.	1.	4.
55	22586.	0.	135.	14.	18.	0.	28.	35.	5.	1.	1.
60	23322.	0.	174.	14.	30.	0.	44.	34.	8.	1.	1.
65	21695.	0.	331.	16.	21.	0.	23.	21.	6.	2.	0.
70	18173.	0.	493.	9.	9.	0.	27.	6.	4.	2.	0.
75	13361.	0.	699.	7.	6.	0.	9.	9.	2.	2.	1.
80	7962.	0.	737.	5.	8.	0.	12.	4.	0.	0.	0.
85	4843.	0.	928.	0.	0.	0.	0.	0.	0.	0.	0.
total	382546.	4899.	3782.	1139.	1493.	0.	1829.	1857.	352.	111.	195.

region		south									
-----											
age	population	births	deaths	migration from south to				west	n.-middl	l.-north	up-north
				stockh.	east-mid	sout-mid	south				
0	42021.	0.	64.	134.	117.	175.	0.	169.	56.	16.	29.
5	40517.	0.	12.	85.	69.	142.	0.	121.	34.	13.	17.
10	36922.	1.	8.	46.	47.	65.	0.	58.	17.	10.	14.
15	36014.	415.	13.	101.	67.	156.	0.	135.	27.	14.	10.
20	40003.	2213.	17.	320.	233.	353.	0.	410.	80.	32.	59.
25	45715.	2960.	26.	298.	201.	267.	0.	331.	84.	32.	62.
30	39232.	1475.	16.	150.	82.	151.	0.	153.	43.	23.	31.
35	32585.	413.	26.	69.	49.	53.	0.	84.	17.	9.	5.
40	31697.	65.	33.	44.	31.	42.	0.	43.	12.	8.	5.
45	34344.	2.	93.	25.	21.	38.	0.	30.	9.	4.	6.
50	37490.	0.	159.	31.	22.	41.	0.	32.	11.	4.	5.
55	34757.	0.	153.	25.	14.	28.	0.	26.	6.	3.	3.
60	35763.	0.	276.	11.	19.	24.	0.	26.	5.	2.	0.
65	33171.	0.	482.	24.	14.	22.	0.	22.	7.	1.	1.
70	27203.	0.	695.	10.	12.	13.	0.	14.	3.	2.	0.
75	20049.	0.	948.	10.	7.	6.	0.	12.	1.	0.	0.
80	12656.	0.	1022.	10.	2.	5.	0.	4.	1.	0.	0.
85	8734.	0.	1670.	0.	0.	0.	0.	0.	0.	0.	0.
total	588873.	7544.	5713.	1393.	1007.	1581.	0.	1670.	413.	173.	247.

APPENDIX A2 *Continued.*

region		west									
age	population	births	deaths	migration from			west to				
				stockh.	east-mid	south-mid	south	west	n.-middl	l.-north	up-north
0	60930.	0.	108.	171.	218.	176.	182.	0.	149.	52.	79.
5	57595.	0.	15.	122.	139.	118.	143.	0.	103.	48.	49.
10	51924.	0.	7.	72.	79.	66.	89.	0.	55.	22.	23.
15	51108.	572.	14.	134.	133.	139.	152.	0.	118.	20.	41.
20	55998.	3100.	22.	369.	374.	320.	413.	0.	230.	86.	98.
25	63932.	4276.	22.	310.	315.	232.	294.	0.	226.	67.	101.
30	52383.	1915.	35.	150.	154.	136.	173.	0.	94.	49.	49.
35	44102.	590.	35.	78.	80.	65.	87.	0.	61.	20.	24.
40	43472.	123.	56.	46.	36.	40.	58.	0.	36.	9.	7.
45	46273.	12.	122.	51.	41.	30.	42.	0.	34.	11.	9.
50	51997.	0.	161.	31.	40.	35.	48.	0.	28.	4.	6.
55	47987.	0.	276.	22.	30.	24.	36.	0.	19.	6.	6.
60	48249.	0.	368.	35.	28.	29.	51.	0.	20.	2.	3.
65	43514.	0.	625.	20.	21.	24.	33.	0.	24.	3.	2.
70	36060.	0.	930.	15.	13.	14.	23.	0.	8.	2.	0.
75	26633.	0.	1292.	9.	7.	7.	11.	0.	5.	1.	1.
80	16217.	0.	1430.	11.	5.	5.	8.	0.	2.	1.	0.
85	10060.	0.	1935.	0.	0.	0.	0.	0.	0.	0.	0.
total	808434.	10588.	7453.	1646.	1713.	1460.	1843.	0.	1212.	403.	498.

region		n.-middl									
age	population	births	deaths	migration from n.-middl to							
				stockh.	east-mid	south-mid	south	west	n.-middl	l.-north	up-north
0	27911.	0.	45.	113.	209.	40.	29.	127.	0.	62.	68.
5	29025.	0.	10.	79.	168.	30.	23.	98.	0.	30.	41.
10	27749.	0.	4.	58.	110.	18.	19.	62.	0.	23.	14.
15	27911.	412.	8.	380.	332.	32.	43.	192.	0.	56.	28.
20	26831.	1610.	17.	555.	581.	51.	69.	377.	0.	108.	82.
25	29568.	1747.	16.	226.	307.	53.	47.	197.	0.	84.	70.
30	25359.	861.	19.	101.	149.	22.	31.	83.	0.	40.	50.
35	22573.	279.	22.	51.	76.	15.	18.	58.	0.	32.	23.
40	23255.	50.	37.	48.	75.	18.	14.	40.	0.	15.	8.
45	25381.	1.	60.	38.	57.	11.	14.	32.	0.	15.	9.
50	29107.	0.	107.	38.	53.	6.	12.	25.	0.	18.	4.
55	27023.	0.	152.	22.	38.	9.	4.	21.	0.	10.	10.
60	27854.	0.	248.	24.	39.	9.	8.	27.	0.	11.	2.
65	26333.	0.	427.	31.	45.	6.	7.	22.	0.	9.	2.
70	21756.	0.	632.	13.	26.	4.	4.	8.	0.	4.	3.
75	15688.	0.	828.	12.	8.	3.	2.	4.	0.	5.	1.
80	8974.	0.	900.	8.	17.	0.	1.	4.	0.	3.	1.
85	5028.	0.	1027.	0.	0.	0.	0.	0.	0.	0.	0.
total	427326.	4960.	4559.	1797.	2290.	327.	345.	1377.	0.	525.	416.

region l.-north											
age	population	births	deaths	migration from l.-north to				west	n.-middl	l.-north	up-north
				stockh.	east-mid	sout-mid	south				
0	13246.	0.	30.	69.	68.	12.	23.	34.	48.	0.	71.
5	13603.	0.	6.	55.	48.	7.	13.	24.	37.	0.	53.
10	12710.	0.	1.	25.	26.	9.	9.	25.	25.	0.	17.
15	13100.	139.	9.	261.	94.	19.	28.	85.	52.	0.	71.
20	12236.	758.	4.	374.	183.	22.	49.	89.	112.	0.	135.
25	13487.	827.	4.	128.	96.	19.	30.	50.	62.	0.	116.
30	12016.	433.	5.	66.	43.	6.	13.	22.	40.	0.	49.
35	10659.	155.	13.	27.	27.	12.	9.	18.	31.	0.	24.
40	11132.	24.	18.	22.	8.	5.	3.	11.	14.	0.	9.
45	12094.	0.	28.	14.	12.	3.	5.	16.	15.	0.	14.
50	13562.	0.	60.	20.	15.	4.	6.	8.	17.	0.	13.
55	12629.	0.	76.	22.	10.	1.	3.	8.	12.	0.	6.
60	12895.	0.	114.	23.	15.	1.	11.	5.	15.	0.	7.
65	12018.	0.	207.	21.	12.	2.	0.	2.	2.	0.	7.
70	10161.	0.	299.	6.	10.	3.	4.	2.	7.	0.	2.
75	7222.	0.	382.	3.	4.	0.	2.	1.	2.	0.	3.
80	4264.	0.	433.	5.	4.	1.	0.	1.	3.	0.	0.
85	2389.	0.	443.	0.	0.	0.	0.	0.	0.	0.	0.
total	199423.	2336.	2132.	1141.	675.	126.	208.	401.	494.	0.	597.

region up-north											
age	population	births	deaths	migration from up-north to				west	n.-middl	l.-north	up-north
				stockh.	east-mid	sout-mid	south				
0	18343.	0.	26.	61.	83.	31.	18.	44.	56.	52.	0.
5	18405.	0.	6.	42.	60.	15.	13.	33.	28.	48.	0.
10	17609.	0.	5.	23.	33.	11.	12.	18.	12.	31.	0.
15	18181.	192.	8.	421.	147.	22.	35.	70.	48.	54.	0.
20	17215.	1037.	7.	394.	221.	28.	61.	128.	74.	152.	0.
25	18426.	1243.	9.	134.	152.	28.	36.	75.	79.	101.	0.
30	16052.	623.	13.	60.	61.	16.	17.	30.	28.	51.	0.
35	14620.	217.	11.	29.	37.	10.	8.	17.	27.	31.	0.
40	14450.	41.	22.	28.	24.	6.	8.	10.	10.	24.	0.
45	14808.	3.	26.	21.	23.	7.	3.	8.	12.	19.	0.
50	15314.	0.	72.	16.	16.	6.	6.	13.	15.	14.	0.
55	14106.	0.	86.	10.	21.	6.	2.	4.	9.	13.	0.
60	13619.	0.	130.	17.	17.	4.	3.	10.	3.	18.	0.
65	11816.	0.	190.	21.	11.	3.	1.	1.	2.	10.	0.
70	9573.	0.	263.	8.	2.	1.	3.	5.	4.	2.	0.
75	6338.	0.	349.	3.	3.	1.	1.	1.	0.	1.	0.
80	3627.	0.	335.	3.	2.	0.	2.	2.	2.	2.	0.
85	1966.	0.	389.	0.	0.	0.	0.	0.	0.	0.	0.
total	244468.	3356.	1947.	1291.	913.	195.	229.	469.	409.	623.	0.

APPENDIX A3 Total.

region		stockh.		migration from stockh. to		west n.-midl l.-north up-north	
age	population	births	deaths	stockh. east-mid	south	west n.-midl l.-north up-north	1.-north up-north
0	103984.	0.	189.	0.	330.	383.	325.
5	104258.	0.	27.	0.	920.	261.	211.
10	94602.	3.	27.	0.	476.	176.	155.
15	90605.	918.	39.	0.	577.	190.	166.
20	108506.	5321.	62.	0.	1512.	354.	356.
25	143416.	8690.	103.	0.	1897.	459.	522.
30	120819.	4465.	136.	0.	1067.	271.	267.
35	89615.	1107.	132.	0.	593.	153.	128.
40	81126.	210.	113.	0.	354.	109.	109.
45	87488.	16.	344.	0.	321.	96.	74.
50	100757.	0.	567.	0.	291.	108.	66.
55	87716.	0.	811.	0.	242.	67.	62.
60	84353.	0.	1165.	0.	265.	91.	65.
65	69623.	0.	1539.	0.	188.	94.	35.
70	51477.	0.	1922.	0.	80.	44.	19.
75	35016.	0.	2139.	0.	52.	20.	15.
80	21126.	0.	2177.	0.	35.	16.	7.
85	12334.	0.	2438.	0.	0.	0.	0.
total	1486821.	20730.	14030.	0.	10226.	2728.	2659.
						3458.	2408.
						3320.	4824.
						4824.	2659.
						3320.	2408.

region		east-mid		migration from east-mid to		west n.-midl l.-north up-north	
age	population	births	deaths	stockh. east-mid	south	west n.-midl l.-north up-north	1.-north up-north
0	98471.	0.	206.	0.	371.	331.	275.
5	106742.	0.	37.	0.	264.	238.	209.
10	95498.	0.	16.	0.	135.	151.	105.
15	92175.	1253.	53.	0.	235.	234.	110.
20	99069.	6057.	67.	0.	532.	513.	340.
25	118183.	7581.	93.	0.	553.	505.	392.
30	98668.	3552.	111.	0.	309.	244.	202.
35	78003.	917.	111.	0.	144.	178.	117.
40	73592.	185.	154.	0.	93.	103.	65.
45	78128.	13.	270.	0.	83.	97.	37.
50	89439.	0.	432.	0.	31.	70.	31.
55	82320.	0.	625.	0.	55.	59.	23.
60	61462.	0.	1042.	0.	52.	70.	31.
65	71560.	0.	1587.	0.	49.	50.	16.
70	57506.	0.	2132.	0.	29.	22.	7.
75	39231.	0.	2605.	0.	11.	10.	3.
80	22841.	0.	2502.	0.	6.	21.	0.
85	12841.	0.	2743.	0.	0.	0.	0.
total	1397129.	19558.	14769.	0.	3005.	2885.	1635.
						4484.	5205.
						4484.	1635.
						4484.	1635.
						4484.	1635.



region		south		mid		north		up-north	
age population		births	deaths	stockh.	migration from south to	stockh.	west n.-middl	east n.-middl	up-north
		out/mid	to	south	mid	to	l.-north	l.-north	up-north
0	52091.	0.	144.	200.	323.	0.	425.	96.	36.
5	56744.	0.	18.	152.	286.	0.	282.	78.	10.
10	52021.	1.	13.	105.	112.	0.	150.	32.	10.
15	52566.	592.	44.	267.	304.	0.	344.	49.	16.
20	52731.	3116.	44.	617.	708.	0.	820.	141.	55.
25	56919.	3903.	41.	414.	522.	0.	647.	107.	58.
30	48268.	1836.	45.	172.	241.	0.	307.	74.	20.
35	41642.	560.	51.	96.	113.	0.	176.	36.	7.
40	41206.	161.	75.	70.	81.	0.	120.	31.	3.
45	4054.	5.	116.	64.	75.	0.	83.	21.	7.
50	49159.	0.	210.	41.	55.	0.	59.	20.	5.
55	46028.	0.	367.	26.	42.	0.	66.	7.	3.
60	47380.	0.	552.	28.	50.	0.	54.	15.	1.
65	42305.	0.	669.	25.	37.	0.	48.	15.	4.
70	34312.	0.	1245.	15.	24.	0.	16.	8.	3.
75	24153.	0.	1480.	10.	11.	0.	12.	3.	1.
80	13788.	0.	1438.	8.	9.	0.	7.	1.	0.
85	8325.	0.	1738.	0.	0.	0.	0.	0.	0.
total	763793.	10174.	8458.	2310.	2953.	0.	3631.	3616.	734.
									238.
									408.

region		south		mid		north		up-north	
age population		births	deaths	stockh.	migration from south to	stockh.	west n.-middl	east n.-middl	up-north
		out/mid	to	south	mid	to	l.-north	l.-north	up-north
0	77524.	0.	146.	274.	247.	372.	393.	123.	37.
5	83470.	0.	24.	199.	160.	261.	232.	73.	34.
10	75465.	1.	15.	101.	88.	150.	123.	38.	23.
15	73763.	814.	37.	222.	169.	257.	255.	49.	27.
20	81056.	4466.	66.	615.	441.	654.	685.	147.	68.
25	93784.	6181.	78.	618.	442.	582.	758.	185.	59.
30	81242.	3037.	67.	305.	196.	335.	350.	92.	48.
35	64836.	1650.	89.	155.	114.	153.	192.	43.	22.
40	63957.	144.	110.	98.	70.	82.	103.	28.	15.
45	68383.	8.	212.	61.	54.	85.	60.	29.	10.
50	74554.	0.	401.	41.	41.	84.	67.	22.	7.
55	68242.	0.	486.	46.	33.	51.	52.	18.	5.
60	69531.	0.	835.	28.	36.	40.	58.	8.	3.
65	62351.	0.	1278.	35.	27.	40.	39.	11.	2.
70	48819.	0.	1666.	14.	22.	14.	20.	7.	3.
75	34292.	0.	2034.	17.	10.	14.	15.	5.	1.
80	20560.	0.	1967.	16.	5.	7.	7.	1.	0.
85	13687.	0.	2830.	0.	0.	0.	0.	0.	0.
total	1157556.	15501.	12341.	2869.	2155.	3209.	3416.	871.	369.
									524.

APPENDIX A3 *Continued.*

region		west		migration from		west to		west n.-middl l.--north		up-north	
age population		births	deaths	stockh.	east-mid	south	stockh.	west n.-middl l.--north	up-north		
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0	111839.	0.	254.	314.	433.	359.	374.	0.	332.	120.	156.
5	118446.	0.	38.	229.	284.	265.	274.	0.	221.	84.	94.
10	106669.	0.	26.	157.	161.	142.	171.	0.	106.	43.	53.
15	105091.	1174.	55.	247.	242.	233.	283.	0.	184.	42.	75.
20	114072.	6456.	82.	705.	715.	571.	748.	0.	445.	155.	189.
25	132206.	8762.	86.	641.	670.	515.	592.	0.	495.	146.	224.
30	109873.	3969.	125.	337.	366.	296.	372.	0.	231.	110.	118.
35	90711.	1228.	111.	175.	194.	138.	209.	0.	133.	40.	59.
40	87552.	246.	162.	117.	88.	84.	146.	0.	75.	20.	25.
45	93330.	17.	305.	109.	82.	71.	93.	0.	70.	20.	27.
50	104715.	0.	525.	59.	77.	75.	101.	0.	55.	14.	16.
55	94985.	0.	709.	38.	59.	47.	74.	0.	43.	10.	10.
60	94864.	0.	1118.	53.	47.	53.	92.	0.	42.	12.	11.
65	83118.	0.	1680.	35.	48.	45.	75.	0.	37.	7.	5.
70	66011.	0.	2310.	22.	20.	23.	45.	0.	9.	3.	0.
75	46760.	0.	2781.	13.	9.	9.	16.	0.	9.	1.	1.
80	27076.	0.	2795.	14.	7.	9.	11.	0.	6.	1.	0.
85	16005.	0.	3390.	0.	0.	0.	0.	0.	0.	0.	0.
total	1603323.	21852.	16572.	3265.	3502.	2935.	3676.	0.	2494.	828.	1063.

region		n.-middl		migration from		west n.-middl to		west n.-middl l.--north		up-north	
age population		births	deaths	stockh.	east-mid	south	stockh.	west n.-middl l.--north	up-north		
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0	511720.	0.	113.	237.	449.	76.	67.	256.	0.	135.	135.
5	59612.	0.	20.	175.	320.	66.	59.	187.	0.	85.	85.
10	57016.	0.	18.	108.	215.	33.	32.	119.	0.	52.	36.
15	57640.	785.	36.	530.	500.	54.	89.	284.	0.	93.	47.
20	57125.	3307.	51.	1018.	1081.	81.	136.	673.	0.	221.	149.
25	62398.	3658.	61.	581.	769.	117.	101.	453.	0.	181.	166.
30	52371.	1796.	67.	228.	349.	53.	71.	212.	0.	104.	107.
35	45554.	536.	65.	130.	186.	41.	41.	125.	0.	64.	54.
40	46916.	111.	104.	93.	137.	33.	31.	84.	0.	40.	22.
45	50999.	6.	179.	85.	122.	24.	26.	67.	0.	32.	21.
50	58927.	0.	306.	82.	108.	13.	27.	53.	0.	32.	16.
55	54322.	0.	458.	41.	75.	15.	21.	41.	0.	24.	17.
60	55343.	0.	713.	41.	66.	21.	22.	47.	0.	30.	4.
65	50830.	0.	1138.	49.	11.	13.	13.	41.	0.	15.	4.
70	40512.	0.	1565.	24.	41.	7.	7.	19.	0.	8.	5.
75	28259.	0.	1883.	14.	12.	3.	3.	11.	0.	9.	1.
80	15484.	0.	1784.	11.	21.	2.	4.	4.	0.	3.	2.
85	8392.	0.	1876.	0.	0.	0.	0.	0.	0.	0.	0.
total	853655.	10199.	10437.	3447.	4528.	650.	732.	2676.	0.	1128.	873.

region l.-north		migration from l.-north to		migration from l.-north to		migration from l.-north to		migration from l.-north to		
age population		stockh.	east-mid	south	stockh.	east-mid	south	stockh.	east-mid	
births		south		south		south		south		
deaths		south		south		south		south		
0	24362.	0.	149.	133.	26.	44.	62.	115.	0.	142.
5	27880.	0.	111.	83.	12.	28.	50.	80.	0.	101.
10	26097.	1.	55.	59.	16.	17.	41.	44.	0.	41.
15	27313.	303.	363.	147.	47.	53.	117.	97.	0.	100.
20	26584.	1481.	26.	361.	46.	98.	193.	223.	0.	239.
25	28571.	1695.	18.	320.	39.	76.	113.	145.	0.	267.
30	24688.	904.	23.	133.	116.	34.	58.	87.	0.	130.
35	21618.	297.	40.	70.	18.	17.	42.	57.	0.	60.
40	22220.	62.	53.	53.	24.	14.	24.	35.	0.	31.
45	24363.	0.	32.	27.	9.	28.	28.	30.	0.	29.
50	27518.	0.	155.	36.	27.	8.	10.	15.	0.	23.
55	25602.	0.	207.	44.	15.	2.	10.	14.	0.	12.
60	26072.	0.	338.	36.	23.	15.	13.	23.	0.	16.
65	23522.	0.	556.	37.	22.	4.	5.	11.	0.	9.
70	19123.	0.	719.	16.	16.	6.	2.	11.	0.	6.
75	13123.	0.	904.	3.	7.	1.	1.	3.	0.	7.
80	7489.	0.	841.	7.	4.	0.	1.	5.	0.	1.
85	4113.	0.	867.	0.	0.	0.	0.	0.	0.	0.
total	400292.	4743.	2147.	1349.	270.	437.	779.	1026.	0.	1214.

region up-north		migration from up-north to		migration from up-north to		migration from up-north to		migration from up-north to		
age population		stockh.	east-mid	south	stockh.	east-mid	south	stockh.	east-mid	
births		south		south		south		south		
deaths		south		south		south		south		
0	33864.	0.	134.	167.	56.	37.	92.	101.	0.	119.
5	37803.	0.	84.	114.	25.	27.	43.	43.	0.	91.
10	36400.	0.	14.	68.	19.	24.	41.	27.	0.	62.
15	37635.	429.	531.	213.	33.	52.	123.	76.	0.	78.
20	36559.	2114.	728.	428.	111.	111.	244.	148.	0.	274.
25	38758.	2577.	310.	307.	59.	83.	172.	161.	0.	221.
30	32490.	1326.	141.	141.	41.	37.	78.	61.	0.	108.
35	26644.	423.	62.	72.	16.	24.	38.	53.	0.	58.
40	2334.	73.	53.	42.	15.	17.	23.	24.	0.	57.
45	30104.	6.	41.	41.	13.	13.	23.	22.	0.	39.
50	31420.	0.	182.	37.	32.	11.	28.	26.	0.	28.
55	28874.	0.	239.	21.	33.	13.	19.	19.	0.	28.
60	27741.	0.	337.	27.	29.	9.	15.	16.	0.	31.
65	23736.	0.	572.	33.	6.	3.	7.	7.	0.	20.
70	18239.	0.	719.	12.	4.	5.	4.	4.	0.	6.
75	11802.	0.	815.	5.	4.	1.	1.	3.	0.	1.
80	6441.	0.	701.	4.	4.	0.	3.	2.	0.	4.
85	3314.	0.	714.	0.	0.	0.	0.	0.	0.	0.
total	444569.	6948.	2209.	1741.	375.	461.	947.	795.	1225.	0.



*Appendix B*

**AGE-SPECIFIC MORTALITY, FERTILITY, AND MIGRATION RATES,  
TOTAL POPULATION, 1974**

## APPENDIX B

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death rates
*****
age      stockh.  east-mid  sout/mid  south      west n.--middl  l.--north  up-north
0        0.001818  0.002092  0.002764  0.001883  0.002271  0.002185  0.002504  0.002008
5        0.000259  0.000347  0.000317  0.000288  0.000321  0.000336  0.000502  0.000238
10       0.000285  0.000168  0.000250  0.000199  0.000244  0.000316  0.000115  0.000385
15       0.000430  0.000575  0.000837  0.000502  0.000523  0.000625  0.000952  0.000744
20       0.000571  0.000676  0.000834  0.000814  0.000719  0.000893  0.000828  0.000793
25       0.000718  0.000787  0.000720  0.000832  0.000651  0.000978  0.000630  0.000800
30       0.001126  0.000922  0.000932  0.000825  0.001138  0.001279  0.000932  0.001064
35       0.001473  0.001423  0.001225  0.001332  0.001224  0.001427  0.001850  0.001181
40       0.002626  0.002093  0.001820  0.001720  0.002079  0.002217  0.002385  0.001840
45       0.003932  0.003412  0.002633  0.003100  0.003268  0.003510  0.003571  0.002359
50       0.005627  0.004809  0.004272  0.005376  0.005014  0.005196  0.005633  0.005792
55       0.009246  0.007592  0.007973  0.007122  0.007464  0.008420  0.008085  0.008277
60       0.013811  0.012828  0.011650  0.012009  0.011785  0.012837  0.012962  0.012148
65       0.022105  0.022177  0.020493  0.020497  0.020212  0.022388  0.023637  0.024098
70       0.037337  0.037074  0.035410  0.034126  0.034994  0.038631  0.037599  0.039421
75       0.061086  0.066402  0.061276  0.059314  0.059474  0.066634  0.068730  0.069056
80       0.103048  0.109540  0.104141  0.095671  0.103228  0.115216  0.112298  0.108834
85       0.197665  0.213613  0.208769  0.206766  0.211809  0.223546  0.210795  0.215450

gross    2.315819  2.432646  2.331592  2.261869  2.332084  2.533158  2.470038  2.472442
crude    0.009436  0.010571  0.011074  0.010661  0.010336  0.012226  0.012326  0.009408
m.age    79.5852   80.0385   80.0173   80.1065   80.1215   79.9925   79.6802   79.9615

```

fertility rates  
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age	stockh.	east-mid	sout/mid	south	west	n.-middl	l.-north	up-north
0	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
5	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
10	0.000032	0.000000	0.000019	0.000013	0.000000	0.000000	0.000038	0.000000
15	0.010132	0.013594	0.011262	0.011035	0.011171	0.013619	0.011094	0.011399
20	0.049039	0.061139	0.059092	0.055098	0.056596	0.057891	0.055710	0.057824
25	0.060593	0.064146	0.068571	0.065907	0.066275	0.058624	0.059326	0.066489
30	0.036956	0.036000	0.038038	0.037382	0.036124	0.034294	0.036617	0.040316
35	0.012353	0.011756	0.013448	0.012718	0.013537	0.011766	0.013739	0.014268
40	0.002589	0.002514	0.003907	0.002252	0.002810	0.002366	0.002790	0.002488
45	0.000183	0.000164	0.000113	0.000117	0.000182	0.000118	0.000000	0.000199
50	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
55	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
60	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
65	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
70	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
75	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
80	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
85	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
gross	0.859379	0.946564	0.972255	0.922607	0.933477	0.893385	0.896569	0.964923
crude	0.013942	0.013999	0.013320	0.013391	0.013629	0.011947	0.011849	0.014049
m.age	27.5221	26.9555	27.3826	27.3058	27.3237	26.9478	27.3453	27.4091

```

outmigration rates
*****
migration from stockh. to
total stockh. east-mid south/mid south west n.-middl l.-north up-north
age
0 0.036054 0.000000 0.013040 0.003174 0.003299 0.003674 0.006318 0.003424 0.003125
5 0.024391 0.000000 0.008824 0.002503 0.002561 0.002465 0.003808 0.002206 0.002024
10 0.015169 0.000000 0.005032 0.001617 0.001860 0.001744 0.002474 0.001638 0.000803
15 0.019877 0.000000 0.006368 0.002097 0.002759 0.002207 0.002925 0.001832 0.001689
20 0.040081 0.000000 0.013935 0.003262 0.004239 0.004958 0.005990 0.003281 0.004415
25 0.039110 0.000000 0.013227 0.003200 0.004128 0.004741 0.006401 0.003640 0.003772
30 0.025633 0.000000 0.008831 0.002243 0.003079 0.002905 0.004122 0.002210 0.002243
35 0.018557 0.000000 0.006617 0.001707 0.002355 0.001975 0.002745 0.001730 0.001428
40 0.012869 0.000000 0.004364 0.001344 0.001578 0.001516 0.001997 0.001344 0.000727
45 0.010276 0.000000 0.003669 0.001097 0.001314 0.001143 0.001680 0.000846 0.000526
50 0.007999 0.000000 0.002888 0.000655 0.001072 0.000913 0.001499 0.000655 0.000318
55 0.008026 0.000000 0.002759 0.000764 0.001539 0.000741 0.001277 0.000707 0.000239
60 0.009721 0.000000 0.003142 0.001079 0.001600 0.000937 0.001932 0.000771 0.000261
65 0.008661 0.000000 0.002700 0.000934 0.001350 0.000776 0.002025 0.000503 0.000373
70 0.004876 0.000000 0.001554 0.000563 0.000719 0.000641 0.000855 0.000369 0.000175
75 0.004198 0.000000 0.001485 0.000571 0.000543 0.000457 0.000628 0.000428 0.000086
80 0.004686 0.000000 0.001657 0.000663 0.000757 0.000379 0.000805 0.000331 0.000095
85 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000

gross 1.450924 0.000000 0.500463 0.137370 0.173762 0.160862 0.237404 0.129569 0.111495
crude 0.019921 0.000000 0.006878 0.001835 0.002326 0.002233 0.003245 0.001788 0.001617
m. age 29.2606 0.0000 28.9594 30.5643 32.1798 28.9638 30.0221 28.1681 24.5333

```



age	migration from east-mid to							
	total stockh.	east-mid	sout/mid	south	west	n.-middl	l.-north	up-north
0	0.032720	0.008266	0.000000	0.003768	0.003361	0.005321	0.006895	0.002315
5	0.021379	0.005743	0.000000	0.002473	0.002230	0.003345	0.004122	0.001508
10	0.013508	0.003738	0.000000	0.001414	0.001581	0.002241	0.002639	0.000796
15	0.025224	0.009742	0.000000	0.002549	0.002539	0.003645	0.004546	0.001009
20	0.055376	0.020733	0.000000	0.005370	0.005178	0.009286	0.008731	0.002645
25	0.044846	0.014537	0.000000	0.004679	0.004273	0.007184	0.008064	0.002792
30	0.026756	0.008057	0.000000	0.003132	0.002473	0.004429	0.004865	0.001753
35	0.018704	0.005372	0.000000	0.001846	0.002282	0.002961	0.003654	0.001090
40	0.012827	0.003587	0.000000	0.001264	0.001454	0.002337	0.002487	0.000883
45	0.009314	0.002907	0.000000	0.001049	0.001226	0.001567	0.001618	0.000468
50	0.006979	0.002137	0.000000	0.000879	0.000779	0.000857	0.001480	0.000501
55	0.005952	0.001652	0.000000	0.000668	0.000717	0.000790	0.001470	0.000377
60	0.006064	0.001449	0.000000	0.000700	0.000859	0.000994	0.001289	0.000393
65	0.005450	0.001733	0.000000	0.000685	0.000699	0.000699	0.001244	0.000168
70	0.003304	0.001165	0.000000	0.000504	0.000383	0.000365	0.000678	0.000122
75	0.002880	0.001249	0.000000	0.000280	0.000255	0.000459	0.000331	0.000076
80	0.002802	0.000919	0.000000	0.000263	0.000263	0.000350	0.000919	0.000000
85	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
<b>gross</b>	1.470432	0.464933	0.000000	0.157615	0.152755	0.234155	0.275159	0.084138
<b>crude</b>	0.020079	0.006348	0.000000	0.002151	0.002065	0.003209	0.003725	0.001170
<b>m.age</b>	27.3378	27.6690	0.0000	27.5608	28.1972	26.8218	27.8746	25.1886

age	migration from sout/mid to						west	n.-middl	l.-north	up-north
	total stockh.	east-mid	sout/mid	south						
0	0.028527	0.003839	0.006201	0.000000	0.006719	0.008159	0.001843	0.000691	0.001075	
5	0.018134	0.002679	0.004335	0.000000	0.004018	0.004970	0.001375	0.000176	0.000582	
10	0.011572	0.002018	0.002153	0.000000	0.003345	0.002883	0.000615	0.000192	0.000365	
15	0.026728	0.005079	0.005783	0.000000	0.007533	0.006544	0.000932	0.000304	0.000552	
20	0.062127	0.011701	0.013427	0.000000	0.016271	0.015551	0.002674	0.001043	0.001460	
25	0.041937	0.007273	0.009171	0.000000	0.009926	0.011367	0.001880	0.000949	0.001370	
30	0.023660	0.003563	0.004993	0.000000	0.005925	0.006360	0.001533	0.000414	0.000870	
35	0.015489	0.002305	0.002714	0.000000	0.004683	0.004227	0.000865	0.000168	0.000528	
40	0.011479	0.001699	0.001966	0.000000	0.003737	0.002912	0.000752	0.000073	0.000340	
45	0.008104	0.001453	0.001702	0.000000	0.002066	0.001884	0.000477	0.000159	0.000363	
50	0.005594	0.000834	0.001119	0.000000	0.001688	0.001200	0.000407	0.000102	0.000244	
55	0.004476	0.000565	0.000912	0.000000	0.001260	0.001434	0.000152	0.000065	0.000087	
60	0.004643	0.000591	0.001055	0.000000	0.001435	0.001140	0.000317	0.000021	0.000084	
65	0.004150	0.000590	0.000873	0.000000	0.001108	0.001132	0.000354	0.000094	0.000000	
70	0.003264	0.000437	0.000699	0.000000	0.001311	0.000466	0.000233	0.000087	0.000029	
75	0.002360	0.000414	0.000455	0.000000	0.000704	0.000497	0.000124	0.000124	0.000041	
80	0.003046	0.000580	0.000653	0.000000	0.001160	0.000508	0.000073	0.000073	0.000000	
85	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	
gross	1.376449	0.228107	0.291056	0.000000	0.364458	0.356167	0.073022	0.023682	0.039958	
crude	0.018186	0.003024	0.003866	0.000000	0.004754	0.004734	0.000961	0.000312	0.000534	
m.age	26.8285	26.6368	26.3659	0.0000	28.2029	26.0619	26.9728	27.3357	25.0269	

age	migration from		south to		south	west	u.-middl	l.-north	up-north
	total stockh.	east-mid	south/mid	south					
0	0.019594	0.003534	0.003186	0.004799	0.000000	0.005069	0.001587	0.000477	0.000942
5	0.012016	0.002384	0.001917	0.003127	0.000000	0.002779	0.000875	0.000407	0.000527
10	0.007288	0.001338	0.001166	0.002094	0.000000	0.001630	0.000504	0.000305	0.000252
15	0.013665	0.003010	0.002291	0.003484	0.000000	0.003457	0.000664	0.000366	0.000393
20	0.033397	0.007587	0.005441	0.008118	0.000000	0.008451	0.001814	0.000839	0.001147
25	0.029547	0.006590	0.004713	0.006206	0.000000	0.008082	0.001973	0.000629	0.001354
30	0.017196	0.003754	0.002413	0.004123	0.000000	0.004308	0.001132	0.000591	0.000874
35	0.010488	0.002319	0.001706	0.002289	0.000000	0.002873	0.000643	0.000329	0.000329
40	0.006489	0.001532	0.001094	0.001282	0.000000	0.001610	0.000438	0.000297	0.000235
45	0.004636	0.000892	0.000790	0.001199	0.000000	0.001009	0.000424	0.000146	0.000175
50	0.003995	0.000925	0.000550	0.001126	0.000000	0.000898	0.000295	0.000094	0.000107
55	0.002989	0.000674	0.000484	0.000747	0.000000	0.000762	0.000147	0.000073	0.000103
60	0.002560	0.000345	0.000518	0.000690	0.000000	0.000805	0.000115	0.000043	0.000043
65	0.002486	0.000561	0.000433	0.000642	0.000000	0.000625	0.000176	0.000032	0.000016
70	0.001844	0.000287	0.000451	0.000492	0.000000	0.000410	0.000143	0.000061	0.000000
75	0.001808	0.000496	0.000292	0.000408	0.000000	0.000437	0.000146	0.000029	0.000000
80	0.001848	0.000778	0.000243	0.000389	0.000000	0.000340	0.000049	0.000049	0.000000
85	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
gross	0.859227	0.185037	0.138428	0.206075	0.000000	0.217740	0.055618	0.023842	0.032487
crude	0.011587	0.002478	0.001862	0.002772	0.000000	0.002951	0.000752	0.000319	0.000453
m.age	26.8679	27.9597	27.0543	26.5712	0.0000	26.7781	26.2410	26.5263	23.6631

age	migration from		west to		south	west	n.-middl	l.-north	up-north
	total stockh.	east-mid	south/mid	west					
0	0.018670	0.002808	0.003872	0.003210	0.003344	0.000000	0.002969	0.001073	0.001395
5	0.012250	0.001933	0.002398	0.002237	0.002313	0.000000	0.001866	0.000709	0.000794
10	0.007809	0.001472	0.001509	0.001331	0.001603	0.000000	0.000994	0.000403	0.000497
15	0.012427	0.002350	0.002303	0.002217	0.002693	0.000000	0.001751	0.000400	0.000714
20	0.030928	0.006180	0.006268	0.005006	0.006557	0.000000	0.003901	0.001359	0.001657
25	0.024840	0.004848	0.005068	0.003895	0.004478	0.000000	0.003752	0.001104	0.001694
30	0.016656	0.003067	0.003331	0.002694	0.003386	0.000000	0.002102	0.001001	0.001074
35	0.010451	0.001929	0.002139	0.001521	0.002304	0.000000	0.001466	0.000441	0.000650
40	0.006339	0.001336	0.001005	0.000959	0.001668	0.000000	0.000857	0.000228	0.000286
45	0.005057	0.001168	0.000879	0.000761	0.000996	0.000000	0.000750	0.000214	0.000289
50	0.003791	0.000563	0.000735	0.000716	0.000965	0.000000	0.000525	0.000134	0.000153
55	0.002958	0.000400	0.000621	0.000495	0.000779	0.000000	0.000453	0.000105	0.000105
60	0.003268	0.000559	0.000495	0.000559	0.000970	0.000000	0.000443	0.000126	0.000116
65	0.003032	0.000421	0.000577	0.000541	0.000902	0.000000	0.000445	0.000084	0.000060
70	0.001848	0.000333	0.000303	0.000348	0.000682	0.000000	0.000136	0.000045	0.000000
75	0.001240	0.000278	0.000192	0.000192	0.000342	0.000000	0.000192	0.000021	0.000021
80	0.001773	0.000517	0.000259	0.000332	0.000406	0.000000	0.000222	0.000037	0.000000
85	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
gross	0.816689	0.150821	0.159771	0.135083	0.171941	0.000000	0.114116	0.037432	0.047525
crude	0.011079	0.002036	0.002184	0.001831	0.002293	0.000000	0.001556	0.000516	0.000663
m.age	27.1210	27.9148	26.3694	26.8956	29.2138	0.0000	26.5157	24.6582	23.5902

age	migration from n.-middl to						
	total stockh.	east-mid	south/mid	south	west	n.-middl	l.-north up-north
0	0.026199	0.004582	0.008681	0.001469	0.001295	0.004950	0.000000
5	0.016389	0.002936	0.005368	0.001107	0.000990	0.003137	0.000000
10	0.010436	0.001894	0.003771	0.000579	0.000561	0.002087	0.000000
15	0.027706	0.009195	0.008675	0.000937	0.001544	0.004927	0.000000
20	0.058801	0.017821	0.018923	0.001418	0.002381	0.011781	0.000000
25	0.037950	0.009311	0.012324	0.001875	0.001619	0.007260	0.000000
30	0.021462	0.004354	0.006664	0.001012	0.001356	0.004048	0.000000
35	0.014071	0.002854	0.004083	0.000900	0.000900	0.002744	0.000000
40	0.009378	0.001982	0.002920	0.000703	0.000661	0.001790	0.000000
45	0.007392	0.001667	0.002392	0.000471	0.000510	0.001314	0.000000
50	0.005620	0.001392	0.001834	0.000221	0.000458	0.000900	0.000000
55	0.004026	0.000754	0.001379	0.000276	0.000110	0.000754	0.000000
60	0.004195	0.000738	0.001188	0.000378	0.000396	0.000846	0.000000
65	0.004131	0.000964	0.001515	0.000216	0.000256	0.000807	0.000000
70	0.002740	0.000592	0.001012	0.000173	0.000173	0.000469	0.000000
75	0.001876	0.000495	0.000425	0.000106	0.000106	0.000389	0.000000
80	0.002842	0.000710	0.001356	0.000129	0.000065	0.000258	0.000000
85	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
gross	1.276078	0.311209	0.412553	0.059852	0.066902	0.242307	0.000000
crude	0.016440	0.004038	0.005304	0.000761	0.000857	0.003135	0.000000
m.age	26.6103	26.5835	26.7030	27.9906	27.7573	26.1920	0.0000
							27.4702
							24.3859

APPENDIX B *Continued.*

age	total	migration: from l.--north to east-mid sout/mid	south	west	u.--middl	l.--north	up-north		
0	0.027543	0.006116	0.005459	0.001067	0.001806	0.002545	0.004720	0.000000	0.005829
5	0.016679	0.003981	0.002977	0.000430	0.001004	0.001793	0.002869	0.000000	0.003623
10	0.010461	0.002108	0.002261	0.000613	0.000651	0.001571	0.001686	0.000000	0.001571
15	0.033830	0.013290	0.005382	0.001721	0.001940	0.004284	0.003551	0.000000	0.003661
20	0.069365	0.025655	0.013580	0.001806	0.003686	0.007260	0.008389	0.000000	0.008990
25	0.041581	0.011200	0.007980	0.001365	0.002660	0.003955	0.005075	0.000000	0.009345
30	0.023493	0.005387	0.004699	0.000891	0.001377	0.002349	0.003524	0.000000	0.005266
35	0.014664	0.003238	0.002452	0.000833	0.000786	0.001943	0.002637	0.000000	0.002775
40	0.008821	0.002385	0.001260	0.000495	0.000630	0.001080	0.001575	0.000000	0.001395
45	0.006732	0.001313	0.001108	0.000369	0.000369	0.001149	0.001231	0.000000	0.001190
50	0.005487	0.001308	0.000981	0.000291	0.000363	0.000545	0.001163	0.000000	0.000836
55	0.004687	0.001719	0.000586	0.000078	0.000391	0.000547	0.000898	0.000000	0.000469
60	0.005139	0.001381	0.000882	0.000115	0.000575	0.000499	0.001074	0.000000	0.000614
65	0.003911	0.001573	0.000935	0.000170	0.000170	0.000213	0.000468	0.000000	0.000383
70	0.003138	0.000837	0.000837	0.000157	0.000314	0.000105	0.000575	0.000000	0.000314
75	0.001825	0.000228	0.000532	0.000076	0.000152	0.000076	0.000228	0.000000	0.000532
80	0.002537	0.000935	0.000534	0.000134	0.000000	0.000134	0.000668	0.000000	0.000134
85	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
gross	1.399457	0.413270	0.262225	0.053054	0.084384	0.150234	0.201659	0.000000	0.234631
crude	0.018042	0.005364	0.003370	0.000675	0.001092	0.001946	0.002563	0.000000	0.003033
m.age	26.2600	26.1935	26.3836	27.0778	26.8010	25.5032	27.5103	0.0000	25.2694

age	migration from up-north to								
	total stockh.	east-mid	south/mid	south	west	n.-middl	l.-north	up-north	
0	0.020846	0.003957	0.004931	0.001653	0.001092	0.002716	0.002982	0.003514	0.000000
5	0.011560	0.002222	0.003016	0.000661	0.000714	0.001402	0.001137	0.002407	0.000000
10	0.007912	0.001291	0.001868	0.000522	0.000659	0.001126	0.000742	0.001703	0.000000
15	0.029388	0.014109	0.005660	0.000877	0.001382	0.003268	0.002019	0.002073	0.000000
20	0.054323	0.019913	0.011707	0.001450	0.003036	0.006674	0.004048	0.007495	0.000000
25	0.033877	0.007998	0.007921	0.001522	0.002141	0.004438	0.004154	0.005702	0.000000
30	0.018425	0.004257	0.004287	0.001247	0.001125	0.002372	0.001855	0.003284	0.000000
35	0.010895	0.002091	0.002429	0.000540	0.000810	0.001282	0.001788	0.001956	0.000000
40	0.008555	0.001806	0.002113	0.000511	0.000579	0.000784	0.000818	0.001943	0.000000
45	0.006212	0.001362	0.001362	0.000432	0.000432	0.000598	0.000731	0.001296	0.000000
50	0.005506	0.001178	0.001018	0.000350	0.000414	0.000764	0.000891	0.000891	0.000000
55	0.004433	0.000727	0.001143	0.000450	0.000208	0.000277	0.000658	0.000970	0.000000
60	0.004830	0.000973	0.001045	0.000324	0.000252	0.000541	0.000577	0.001117	0.000000
65	0.004129	0.001390	0.000927	0.000253	0.000126	0.000295	0.000295	0.000843	0.000000
70	0.002248	0.000658	0.000219	0.000274	0.000164	0.000384	0.000219	0.000329	0.000000
75	0.001440	0.000424	0.000339	0.000085	0.000169	0.000085	0.000254	0.000085	0.000000
80	0.002950	0.000621	0.000621	0.000000	0.000311	0.000466	0.000311	0.000621	0.000000
85	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
gross	1.137644	0.324889	0.253030	0.055757	0.068080	0.137355	0.117396	0.181138	0.000000
crude	0.015798	0.004588	0.003520	0.000758	0.000932	0.001915	0.001607	0.002477	0.000000
m.age	27.3128	26.2539	26.9527	28.3810	28.5269	26.5808	28.3021	28.8438	0.0000





*Appendix C*

**EXPECTATIONS OF LIFE BY REGION OF BIRTH AND REGION OF  
RESIDENCE, TOTAL POPULATION, 1974**

## APPENDIX C

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age      initial region of cohort stockh.
***      *****
          east-mid  sout/mid  south  west  n.-middl  l.-north  up-north
0      75.21929  37.50885  10.48699  3.66976  5.19077  6.18108  5.84106  3.06048  3.28030
5      70.89455  33.24197  10.44243  3.66740  5.20030  6.19392  5.82366  3.05045  3.27442
10     65.98883  29.33208  10.09865  3.57478  5.10340  6.08542  5.65228  2.95711  3.18510
15     61.07421  25.77537  9.64496  3.44288  4.96105  5.92989  5.42371  2.82927  3.06708
20     56.22113  22.50122  9.13286  3.28627  4.77920  5.73488  5.16505  2.68481  2.93682
25     51.39646  19.58431  8.53521  3.10347  4.53821  5.45964  4.87118  2.52788  2.77655
30     46.57997  17.07876  7.84497  2.89009  4.23818  5.08636  4.52366  2.34693  2.57102
35     41.81530  14.89374  7.10679  2.64991  3.90112  4.65555  4.13190  2.14282  2.33347
40     37.09409  12.90631  6.34621  2.39183  3.53631  4.19477  3.71517  1.92540  2.07808
45     32.48816  11.07800  5.59035  2.12823  3.15740  3.72178  3.29084  1.70200  1.81956
50     28.01385  9.37649  4.84693  1.86312  2.77303  3.24578  2.86706  1.47696  1.56449
55     23.69677  7.78834  4.12004  1.59950  2.39158  2.77634  2.44856  1.25557  1.31683
60     19.59362  6.32465  3.41959  1.34313  2.01896  2.32253  2.04147  1.04126  1.08203
65     15.72870  5.00121  2.75012  1.09480  1.65416  1.88627  1.64672  0.83484  0.86058
70     12.25753  3.86277  2.14068  0.86444  1.31506  1.48663  1.27914  0.64684  0.66197
75     9.23570  2.90629  1.60288  0.65871  1.01225  1.13295  0.95013  0.48220  0.49029
80     6.75794  2.14326  1.15873  0.48672  0.76075  0.83604  0.67503  0.34671  0.35071
85     4.80925  1.56885  0.80819  0.34781  0.55584  0.59208  0.45278  0.24179  0.24190

```

age	total stockh.	east-mid	sout/mid	east-mid	south	west	n.-middl	l.-north	up-north
0	75.17247	10.03944	36.60080	4.02699	5.14036	7.51736	6.36857	2.45373	3.02521
5	70.93823	10.05479	32.33191	4.02674	5.15508	7.53436	6.35814	2.45280	3.02442
10	66.05460	9.84194	28.33196	3.92417	5.06109	7.38800	6.17563	2.38807	2.94373
15	61.11592	9.54538	24.62771	3.78225	4.92308	7.17972	5.92882	2.29844	2.83052
20	56.28669	9.15663	21.27496	3.61836	4.75249	6.92799	5.64700	2.20123	2.70803
25	51.47595	8.55437	18.45487	3.41645	4.51628	6.56992	5.31220	2.08875	2.56309
30	46.66568	7.77745	16.16941	3.17195	4.21284	6.09254	4.91520	1.94775	2.37853
35	41.89041	6.95941	14.19095	2.89642	3.87168	5.55367	4.47395	1.78185	2.16248
40	37.16567	6.14429	12.38337	2.60416	3.50506	4.98718	4.01038	1.60261	1.92862
45	32.53946	5.34888	10.70527	2.30828	3.12275	4.40907	3.53887	1.41699	1.68936
50	28.04913	4.58045	9.13299	2.01408	2.73559	3.83199	3.07141	1.22986	1.45276
55	23.71130	3.84178	7.64893	1.72269	2.35152	3.26624	2.61250	1.04505	1.22258
60	19.57506	3.14576	6.25558	1.43947	1.97728	2.72126	2.16690	0.86524	1.00356
65	15.69102	2.50910	4.96587	1.16842	1.61537	2.20257	1.73952	0.69272	0.79746
70	12.21161	1.95455	3.82670	0.91997	1.28217	1.73169	1.34723	0.53615	0.61316
75	9.17523	1.48116	2.84103	0.69897	0.98545	1.31681	0.99861	0.39906	0.45413
80	6.70512	1.10369	2.04440	0.51666	0.74216	0.97368	0.71091	0.28748	0.32614
85	4.75237	0.81539	1.42429	0.37015	0.54426	0.69221	0.47883	0.20122	0.22603

age	initial region of cohort	south	mid	east-mid	south	mid	west	n.-middl	l.-north	up-north
0	75.14775	6.60551	7.35761	36.04219	9.02867	9.98900	3.13832	1.25530	1.73116	
5	71.14213	6.65164	7.38779	31.83216	9.07547	10.03194	3.15813	1.26363	1.74135	
10	66.25081	6.54695	7.21692	27.72430	8.89682	9.81146	3.10034	1.24458	1.70944	
15	61.32915	6.39476	6.98396	23.89223	8.64463	9.51284	3.01735	1.21855	1.66483	
20	56.55002	6.18852	6.70670	20.44653	8.32137	9.15682	2.92509	1.18929	1.61569	
25	51.76319	5.83186	6.30884	17.64076	7.84200	8.64474	2.80034	1.14628	1.54836	
30	46.94614	5.33568	5.79634	15.45001	7.23440	7.97282	2.62699	1.07980	1.45010	
35	42.16649	4.79646	5.23987	13.57119	6.58767	7.23355	2.41653	0.99458	1.32665	
40	37.42794	4.24885	4.66922	11.85406	5.91703	6.46869	2.18304	0.89883	1.18823	
45	32.78062	3.70724	4.10302	10.25953	5.23311	5.69718	1.93827	0.79795	1.04432	
50	28.25678	3.17746	3.54676	8.76501	4.54993	4.93366	1.68966	0.69463	0.89966	
55	23.89929	2.66660	3.00545	7.35772	3.88440	4.19337	1.44250	0.59178	0.75747	
60	19.76058	2.18570	2.48647	6.04242	3.24607	3.48530	1.20141	0.49146	0.62175	
65	15.85056	1.74238	1.99184	4.81819	2.63393	2.80976	0.96723	0.39423	0.49300	
70	12.34104	1.35504	1.54459	3.73186	2.07789	2.19858	0.74978	0.30555	0.37775	
75	9.28348	1.02485	1.15132	2.79473	1.58831	1.66284	0.55523	0.22760	0.27861	
80	6.77264	0.75927	0.82741	2.02982	1.18441	1.21754	0.39265	0.16329	0.19825	
85	4.77810	0.55564	0.57260	1.42758	0.85751	0.85448	0.26143	0.11321	0.13565	

age	initial region of cohort									
	east-mid			south			west			
	total	stockh.	east-mid	south/mid	south	west	n.-middl	l.-north	up-north	
0	75.60024	5.68705	4.96140	5.26726	47.03379	7.44825	2.56802	1.13453	1.49993	
5	71.29830	5.70069	4.97053	5.26303	42.69033	7.45942	2.57278	1.13906	1.50248	
10	66.39843	5.60392	4.87956	5.13110	38.34037	7.32044	2.52599	1.12273	1.47432	
15	61.46451	5.46876	4.75243	4.94794	34.17055	7.13177	2.46088	1.09659	1.43559	
20	56.61955	5.29587	4.59734	4.73066	30.24820	6.90253	2.38684	1.06518	1.39293	
25	51.83350	5.01946	4.37495	4.45694	26.75668	6.57241	2.29157	1.02419	1.33730	
30	47.02996	4.62390	4.06601	4.11904	23.73614	6.10878	2.15556	0.96613	1.25441	
35	42.23713	4.17190	3.70565	3.74192	21.02888	5.56591	1.98426	0.89192	1.14669	
40	37.50431	3.70429	3.32394	3.34802	18.50755	4.99279	1.79424	0.80742	1.02605	
45	32.84446	3.23515	2.93384	2.95322	16.10564	4.40524	1.59394	0.71669	0.90073	
50	28.33395	2.77776	2.54748	2.56708	13.82652	3.82458	1.39116	0.62360	0.77577	
55	24.01658	2.33809	2.17007	2.18996	11.68123	3.26198	1.18971	0.53154	0.65399	
60	19.85179	1.91548	1.79949	1.81991	9.63849	2.71256	0.98949	0.44039	0.53597	
65	15.94949	1.52839	1.44673	1.46928	7.73957	2.19105	0.79677	0.35287	0.42483	
70	12.44243	1.18946	1.12491	1.14961	6.04626	1.71634	0.61766	0.27304	0.32515	
75	9.37270	0.89888	0.83861	0.86644	4.57369	1.29687	0.45663	0.20262	0.23896	
80	6.85433	0.66524	0.60134	0.63168	3.37357	0.94688	0.32181	0.14461	0.16920	
85	4.79992	0.48045	0.41002	0.43965	2.39179	0.65452	0.21087	0.09869	0.11393	

age ***	initial region of cohort *****	west *****	total stockh.	east-mid	sout/mid	west	south	west	n.-middl	l.-north	up-north
0	75.35590	5.19484	5.37768	3.86986	5.56937	48.28500	3.72335	1.46594	1.86985		
5	71.18614	5.22100	5.39328	3.87688	5.59327	44.02718	3.73067	1.46969	1.87418		
10	66.29625	5.14291	5.28496	3.78605	5.49798	39.66611	3.64647	1.43803	1.83373		
15	61.37392	5.02782	5.13393	3.65846	5.35846	35.49340	3.53098	1.39315	1.77772		
20	56.53366	4.87441	4.95353	3.50776	5.18268	31.55916	3.39806	1.34375	1.71431		
25	51.73055	4.62280	4.70217	3.31710	4.92983	28.00887	3.23116	1.28386	1.63475		
30	46.90306	4.26252	4.36158	3.07869	4.59488	24.86393	3.01234	1.20344	1.52567		
35	42.14431	3.85722	3.97340	2.81092	4.22107	22.02610	2.75733	1.10555	1.39273		
40	37.40252	3.43134	3.55682	2.52365	3.81477	19.35671	2.47980	0.99526	1.24418		
45	32.76907	3.00505	3.13692	2.23437	3.39369	16.83223	2.19444	0.88083	1.09154		
50	28.26946	2.58419	2.72220	1.94780	2.96885	14.43329	1.90849	0.76502	0.93961		
55	23.93421	2.17511	2.31512	1.66495	2.55023	12.16144	1.62590	0.65045	0.79101		
60	19.78130	1.78573	1.91829	1.38857	2.14087	10.01175	1.34913	0.53846	0.64850		
65	15.86879	1.42637	1.53941	1.12386	1.74529	8.00705	1.08227	0.43067	0.51385		
70	12.35032	1.11036	1.19471	0.88093	1.38073	6.22225	0.83581	0.33242	0.39313		
75	9.28763	0.84055	0.89061	0.66597	1.05689	4.68026	0.61735	0.24652	0.28947		
80	6.75181	0.62203	0.63868	0.48670	0.78676	3.40171	0.43495	0.17575	0.20523		
85	4.74859	0.45636	0.44264	0.34497	0.57036	2.38235	0.28964	0.12176	0.14050		

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age   initial region of cohort  n.-middl
***   *****
      total stockh.  east-mid  sout/mid  south  west  n.-middl  l.-north  up-north
0     74.92428  8.31255  9.58126  2.55023  3.46779  7.68732  37.86399  2.71693  2.74421
5     70.71879  8.35111  9.58886  2.56006  3.48916  7.71349  33.55600  2.71667  2.74343
10    65.83279  8.23084  9.36032  2.51481  3.44866  7.57697  29.38412  2.64667  2.67039
15    60.92691  8.06285  9.04918  2.44890  3.38628  7.38506  25.46697  2.55303  2.57466
20    56.10693  7.79987  8.65750  2.36992  3.30120  7.13765  21.92133  2.44643  2.47303
25    51.32511  7.31427  8.11070  2.26861  3.16743  6.76187  19.03360  2.31660  2.35203
30    46.53263  6.65400  7.42862  2.13330  2.98050  6.25415  16.73615  2.15427  2.19165
35    41.78191  5.96036  6.70489  1.96824  2.75918  5.69180  14.73083  1.96881  1.99780
40    37.05812  5.26684  5.96819  1.78397  2.51078  5.10320  12.87377  1.76858  1.78279
45    32.43740  4.59025  5.24227  1.59130  2.24704  4.50734  11.13414  1.56247  1.56259
50    27.95174  3.93518  4.53292  1.39542  1.97638  3.91553  9.49591  1.35560  1.34480
55    23.62100  3.30394  3.84179  1.19925  1.70519  3.33679  7.94976  1.15177  1.13250
60    19.49905  2.70899  3.17814  1.00747  1.43953  2.78076  6.49970  0.95426  0.93020
65    15.61250  2.16245  2.54884  0.82112  1.17984  2.25024  5.14688  0.76424  0.73890
70    12.13321  1.68646  1.98269  0.64887  0.93927  1.76993  3.94534  0.59212  0.56853
75    9.10690  1.28120  1.48560  0.49535  0.72480  1.34838  2.90739  0.44214  0.42205
80    6.63184  0.95741  1.07913  0.36788  0.54780  0.99870  2.05744  0.31968  0.30380
85    4.69642  0.71499  0.76408  0.26666  0.40600  0.71668  1.38912  0.22611  0.21279

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age	initial region of cohort	l.-north	total stockh.	east-mid	south/mid	south	west	n.-middl	l.-north	up-north
0	74.75915	9.77821	7.57604	2.36689	3.72049	5.84142	5.43098	34.66001	5.38510	
5	70.65922	9.83134	7.60672	2.38274	3.74480	5.88270	5.44386	30.38127	5.38579	
10	65.81908	9.68053	7.46619	2.35440	3.69714	5.81234	5.31817	26.26040	5.22991	
15	60.86647	9.46117	7.26109	2.30801	3.62284	5.69411	5.13960	22.36240	5.01726	
20	56.11240	9.13486	7.01218	2.24487	3.53040	5.53431	4.93875	18.92571	4.79133	
25	51.32085	8.50912	6.62089	2.14748	3.37714	5.26168	4.66917	16.22631	4.50907	
30	46.49521	7.68358	6.09563	2.01642	3.16185	4.88411	4.32829	14.17291	4.15241	
35	41.71934	6.84714	5.52026	1.85948	2.91288	4.45976	3.94934	12.42217	3.74831	
40	37.01884	6.03344	4.92884	1.68621	2.64402	4.01357	3.54915	10.83688	3.32674	
45	32.40574	5.24599	4.33925	1.50430	2.36168	3.55484	3.13859	9.35631	2.90477	
50	27.91741	4.48962	3.76017	1.31909	2.07408	3.09422	2.72912	7.95938	2.49172	
55	23.60725	3.77147	3.19725	1.13423	1.78981	2.64289	2.32725	6.65011	2.09424	
60	19.48207	3.09222	2.65193	0.95220	1.50999	2.20461	1.93378	5.42102	1.71631	
65	15.59908	2.46772	2.13319	0.77631	1.23658	1.78538	1.55402	4.28391	1.36197	
70	12.14934	1.92645	1.66661	0.61517	0.98570	1.40753	1.20744	3.29134	1.04909	
75	9.12107	1.46006	1.25076	0.46970	0.76006	1.07214	0.89752	2.43277	0.77805	
80	6.68250	1.09268	0.91277	0.35021	0.57609	0.79724	0.64315	1.74882	0.56155	
85	4.75874	0.81256	0.64389	0.25305	0.42521	0.57049	0.43628	1.22594	0.39131	



age	initial region of cohort up-north									
***	*****									
	total	stockh.	east-mid	south/mid	south	west	n.-middl	l.-north	up-north	
0	75.03303	8.59987	7.27336	2.32599	3.27462	5.45618	4.05950	3.98495	40.05856	
5	70.76808	8.64132	7.28960	2.32978	3.29374	5.47829	4.06496	3.98526	35.68513	
10	65.85394	8.53860	7.15293	2.28530	3.26008	5.40207	3.98571	3.88641	31.34283	
15	60.96717	8.40619	6.97133	2.22812	3.20974	5.29875	3.88723	3.75019	27.21562	
20	56.17528	8.13862	6.73391	2.15958	3.13826	5.15571	3.76923	3.59622	23.48375	
25	51.37980	7.58457	6.36460	2.06854	3.01420	4.91328	3.60307	3.40099	20.43055	
30	46.56938	6.86003	5.87164	1.94685	2.83210	4.56722	3.37187	3.14937	17.97030	
35	41.80203	6.12266	5.32644	1.79743	2.61643	4.16988	3.09486	2.86741	15.80692	
40	37.06338	5.39639	4.75977	1.62985	2.37744	3.74744	2.79155	2.57146	13.78949	
45	32.42226	4.69474	4.19306	1.45557	2.12492	3.31650	2.47616	2.26981	11.89151	
50	27.87894	4.01475	3.62972	1.27685	1.86459	2.88315	2.15737	1.96425	10.08826	
55	23.57675	3.37520	3.08971	1.10108	1.61012	2.46530	1.84653	1.67020	8.41861	
60	19.45481	2.76969	2.56414	0.92651	1.35862	2.05842	1.53867	1.38397	6.85479	
65	15.55021	2.21115	2.05902	0.75528	1.11174	1.66713	1.23778	1.10742	5.40069	
70	12.11199	1.73067	1.60820	0.59951	0.88791	1.31763	0.96444	0.86003	4.14360	
75	9.10610	1.31656	1.20831	0.45888	0.68725	1.00754	0.71973	0.64183	3.06599	
80	6.68059	0.98819	0.88343	0.34237	0.52313	0.75170	0.51762	0.46593	2.20821	
85	4.73342	0.73271	0.62148	0.24626	0.38578	0.53714	0.35030	0.32801	1.53175	



*Appendix D*

**MULTIREGIONAL POPULATION PROJECTION (CONSTANT AGE-SPECIFIC RATES), 8 REGIONS, 1974–STABILITY**

APPENDIX D

year 1974  
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population  
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age	total	stockh.	east-mid	south/mid	south	west	n.-middl	l.-north	up-north
0	553859.	103984.	98471.	52091.	77524.	111839.	51720.	24362.	33868.
5	594955.	104258.	106742.	56744.	83470.	118446.	59612.	27880.	37803.
10	543768.	94602.	95498.	52021.	75465.	106669.	57016.	26097.	36400.
15	536788.	90605.	92175.	52566.	73763.	105091.	57640.	27313.	37635.
20	575702.	108506.	99069.	52731.	81056.	114072.	57125.	26584.	36559.
25	674235.	143416.	118183.	56919.	93784.	132206.	62398.	28571.	38758.
30	568819.	120819.	98668.	48268.	81242.	109873.	52371.	24688.	32890.
35	463625.	89615.	78003.	41642.	66836.	90711.	45554.	21618.	29646.
40	445910.	81126.	73592.	41206.	63957.	87552.	46916.	22220.	29341.
45	477847.	87488.	79128.	44054.	68383.	93330.	50999.	24363.	30102.
50	536894.	100757.	89839.	49159.	74594.	104715.	58892.	27518.	31420.
55	488159.	87716.	82320.	46028.	68242.	94985.	54392.	25602.	28874.
60	486950.	84353.	81462.	47380.	69531.	94864.	55543.	26076.	27741.
65	427145.	69623.	71560.	42405.	62351.	83118.	50830.	23522.	23736.
70	335999.	51477.	57506.	34312.	48819.	66011.	40512.	19123.	18239.
75	232666.	35016.	39231.	24153.	34292.	46760.	28259.	13153.	11802.
80	134806.	21126.	22841.	13789.	20560.	27076.	15484.	7489.	6441.
85	79011.	12334.	12841.	8325.	13687.	16005.	8392.	4113.	3314.
total	8157138.	1486821.	1397129.	763793.	1157556.	1603323.	853655.	400292.	494569.

percentage distribution

age	total	stockh.	east-mid	south/mid	south	west	n.-middl	l.-north	up-north
0	6.7899	6.9937	7.0481	6.8200	6.6972	6.9755	6.0587	6.0861	6.8480
5	7.2937	7.0121	7.6401	7.4292	7.2109	7.3875	6.9831	6.9649	7.6436
10	6.6662	6.3627	6.8353	6.8109	6.5193	6.6530	6.6790	6.5195	7.3599
15	6.5806	6.0939	6.5975	6.8822	6.3723	6.5546	6.7521	6.8233	7.6097
20	7.0576	7.2979	7.0909	6.9038	7.0023	7.1147	6.6918	6.6412	7.3921
25	8.2656	9.6458	8.4590	7.4521	8.1019	8.2457	7.3095	7.1375	7.8367
30	6.9733	8.1260	7.0622	6.3195	7.0184	6.8528	6.1349	6.1675	6.6502
35	5.6837	6.0273	5.5831	5.4520	5.7739	5.6577	5.3363	5.4006	5.9943
40	5.4665	5.4563	5.2674	5.3949	5.5252	5.4607	5.4959	5.5509	5.9326
45	5.8580	5.8842	5.6636	5.7678	5.9075	5.8210	5.9742	6.0863	6.0865
50	6.5819	6.7767	6.4303	6.4362	6.4441	6.5311	6.8988	6.8745	6.3530
55	5.9844	5.8996	5.8921	6.0262	5.8954	5.9243	6.3717	6.3958	5.8382
60	5.9696	5.6734	5.8307	6.2033	6.0067	5.9167	6.5065	6.5142	5.6091
65	5.2365	4.6827	5.1219	5.5519	5.3864	5.1841	5.9544	5.8762	4.7993
70	4.1191	3.4622	4.1160	4.4923	4.2174	4.1171	4.7457	4.7773	3.6879
75	2.8523	2.3551	2.8080	3.1622	2.9624	2.9164	3.3104	3.2859	2.3863
80	1.6526	1.4209	1.6349	1.8053	1.7762	1.6887	1.8138	1.8709	1.3023
85	0.9686	0.8296	0.9191	1.0900	1.1824	0.9982	0.9831	1.0275	0.6701
total	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000
meas	37.6361	36.7623	37.1761	36.1365	38.0588	37.5544	39.1101	39.1976	36.2575
shd	100.0000	18.2272	17.1277	9.3635	14.1907	19.6555	10.4651	4.9073	6.0630

APPENDIX D Continued.

year 2004  
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population  
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age	total	stockh.	east-mid	sout/mid	south	west	n.-middl	l.-north	up-north
0	491504.	83102.	85100.	45357.	71456.	102774.	47935.	22218.	33563.
5	501624.	81170.	86806.	46930.	72760.	104153.	50911.	23744.	35149.
10	506341.	79722.	87461.	47950.	73497.	104293.	52591.	24800.	36028.
15	504805.	82005.	86507.	47338.	73649.	103764.	52174.	24369.	34999.
20	511941.	92198.	86841.	45449.	75080.	105799.	50333.	23016.	33225.
25	527978.	100855.	88929.	44772.	76780.	109438.	50691.	23168.	33345.
30	542290.	102936.	90789.	46500.	77874.	112621.	52840.	24521.	34208.
35	582598.	107359.	97427.	50625.	84118.	119613.	58564.	27288.	37604.
40	528590.	96155.	87388.	45861.	76500.	107818.	54561.	25383.	34924.
45	515843.	90580.	84427.	45474.	74500.	104904.	54474.	26082.	35402.
50	543451.	94980.	89457.	48364.	79353.	109939.	57273.	27519.	36566.
55	618170.	111926.	104429.	54758.	90565.	122778.	64240.	30567.	38907.
60	497782.	89698.	84506.	44599.	75906.	97736.	50951.	24382.	30004.
65	375235.	62668.	62422.	35163.	58142.	74838.	39740.	18813.	23448.
70	315690.	50351.	51981.	30529.	48865.	63321.	34792.	16234.	19617.
75	269332.	43655.	44342.	26206.	41909.	54261.	29537.	13726.	15695.
80	206233.	34817.	33743.	19981.	32064.	42073.	22416.	10205.	10934.
85	136112.	24006.	21721.	13548.	22123.	27540.	13523.	6636.	7015.
total	8175520.	1428183.	1374275.	739405.	1205141.	1667664.	837547.	392671.	530635.

percentage distribution

age	total	stockh.	east-mid	sout/mid	south	west	n.-middl	l.-north	up-north
0	6.0119	5.8187	6.1923	6.1313	5.9292	6.1627	5.7233	5.6581	6.3251
5	6.1357	5.6634	6.3165	6.3470	6.0375	6.2455	6.0786	6.0468	6.6240
10	6.1934	5.5821	6.3641	6.4819	6.0986	6.2538	6.2792	6.3157	6.7895
15	6.1746	5.7419	6.2947	6.4021	6.1112	6.2221	6.2294	6.2060	6.5958
20	6.2819	6.4556	6.3190	6.1467	6.2300	6.3441	6.0096	5.8615	6.2613
25	6.4580	7.0617	6.4710	6.0552	6.3710	6.5624	6.0523	5.9000	6.2840
30	6.6331	7.2075	6.6063	6.2889	6.4618	6.7532	6.3089	6.2447	6.4466
35	7.1261	7.5171	7.0894	6.8468	6.9799	7.1725	6.9924	6.9493	7.0866
40	6.4655	6.7327	6.3588	6.2025	6.3478	6.4652	6.5144	6.4642	6.5816
45	6.3096	6.3423	6.1434	6.1501	6.1818	6.2905	6.5040	6.6422	6.6716
50	6.6473	6.6504	6.5094	6.5409	6.5845	6.5924	6.8381	7.0083	6.8909
55	7.5612	7.8370	7.5988	7.4056	7.5149	7.3623	7.6700	7.7843	7.3322
60	6.0887	6.2806	6.1491	6.0317	6.2985	5.8607	6.0833	6.2093	5.6543
65	4.5897	4.3880	4.5422	4.7556	4.8245	4.4876	4.7448	4.7909	4.4189
70	3.8614	3.5255	3.7824	4.1288	4.0547	3.7970	4.1541	4.1342	3.6969
75	3.2944	3.0567	3.2266	3.5442	3.4775	3.2537	3.5267	3.4955	2.9578
80	2.5226	2.4379	2.4553	2.7023	2.6606	2.5229	2.6764	2.5990	2.0606
85	1.6649	1.6609	1.5805	1.8323	1.8357	1.6514	1.6145	1.6900	1.3221
total	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000
m.ag	39.8546	39.9961	39.5006	40.0222	40.3454	39.5325	40.3918	40.5490	38.6934
sha	100.0000	17.4690	16.8096	9.0441	14.7498	20.3983	10.2446	4.8030	6.4905
lam	0.993782	0.986149	0.991192	0.989907	0.998733	0.999220	0.992198	0.992577	1.001906
r	-0.001248	-0.002790	-0.001769	-0.002029	-0.000254	-0.000156	-0.001567	-0.001490	0.000381

APPENDIX D Continued.

age	total	stockh.	east-mid	sout/mid	south	west	n.-middl	l.-north	up-north
0	454170.	74620.	77852.	41717.	66933.	96678.	44318.	20479.	31573.
5	457315.	71739.	78195.	42540.	67097.	96479.	46586.	21711.	32966.
10	463059.	70917.	78888.	43221.	68099.	96874.	48078.	22732.	33950.
15	472511.	75110.	80015.	43962.	70192.	98857.	48412.	22679.	33284.
20	485191.	85671.	81597.	42826.	72570.	102259.	47209.	21552.	31496.
25	496374.	92649.	82783.	41996.	73280.	105156.	47485.	21614.	31411.
30	499494.	91790.	82753.	42586.	72581.	105158.	49254.	22738.	32635.
35	496028.	89031.	81726.	42805.	72110.	103359.	50148.	23415.	33434.
40	500343.	88216.	81829.	43296.	73441.	103796.	51396.	24264.	34104.
45	510983.	89179.	83454.	44414.	75892.	105534.	52790.	25173.	34546.
50	516148.	89691.	84581.	45543.	77067.	106781.	53307.	25418.	33760.
55	539881.	91937.	89099.	48160.	81179.	111167.	56725.	26860.	34754.
60	469562.	78392.	77477.	42151.	70920.	96330.	50371.	23590.	30331.
65	426936.	68310.	70090.	39214.	64642.	87612.	46837.	22080.	28152.
70	398343.	63271.	65681.	36982.	61510.	81851.	43368.	20327.	25353.
75	367761.	61078.	61516.	34064.	57558.	75057.	38833.	17996.	21657.
80	208128.	35497.	34331.	19462.	34351.	42409.	20854.	9730.	11493.
85	120026.	20866.	18851.	11642.	20766.	24571.	11133.	5563.	6635.
total	7882253.	1337964.	1310718.	706882.	1180189.	1639939.	807105.	377921.	521535.

year 2024  
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population  
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percentage distribution

age	total	stockh.	east-mid	south/mid	south	west	n.-middl	l.-north	up-north
0	5.7619	5.5772	5.9336	5.9015	5.6713	5.8952	5.4910	5.4188	6.0539
5	5.8018	5.3618	5.9658	6.0180	5.6853	5.8831	5.7719	5.7449	6.3211
10	5.8747	5.3004	6.0187	6.1567	5.7701	5.9072	5.9569	6.0150	6.5096
15	5.9946	5.6138	6.1047	6.2191	5.9475	6.0281	5.9983	6.0011	6.3819
20	6.1555	6.4031	6.2254	6.0585	6.1490	6.2361	5.8492	5.7029	6.0391
25	6.2974	6.9246	6.3158	5.9410	6.2092	6.4122	5.8834	5.7192	6.0228
30	6.3369	6.8604	6.3135	6.0245	6.1499	6.4123	6.1025	6.0166	6.2575
35	6.2930	6.6542	6.2352	6.0535	6.1100	6.3026	6.2134	6.1958	6.4107
40	6.3477	6.5933	6.2431	6.1249	6.2229	6.3293	6.3679	6.4205	6.5391
45	6.4827	6.6653	6.3670	6.2831	6.4305	6.4353	6.5407	6.6610	6.6240
50	6.5482	6.7036	6.4530	6.4428	6.5301	6.5113	6.6047	6.7257	6.4733
55	6.8493	6.8714	6.7977	6.8131	6.8785	6.7787	7.0282	7.1074	6.6638
60	5.9572	5.8590	5.9110	5.9630	6.0092	5.8740	6.2409	6.2420	5.8157
65	5.4164	5.1055	5.3474	5.5475	5.4773	5.3424	5.8030	5.8424	5.3979
70	5.0537	4.7289	5.0110	5.2317	5.2119	4.9911	5.3733	5.3786	4.8612
75	4.6057	4.5650	4.6933	4.8169	4.8770	4.5768	4.8114	4.7618	4.1526
80	2.6405	2.6531	2.6192	2.7533	2.9106	2.5860	2.5838	2.5746	2.2037
85	1.5227	1.5595	1.4382	1.6470	1.7595	1.4983	1.3794	1.4719	1.2721
total	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000
max	41.2219	41.3228	40.9120	41.2817	41.7460	40.9462	41.7144	41.8602	40.1166
std	100.0000	16.9744	16.6287	8.9660	14.9727	20.8055	10.2395	4.7946	6.6166
lam	0.988293	0.982356	0.985502	0.986899	0.991613	0.992944	0.988063	0.987631	0.991345
r	-0.002355	-0.003560	-0.002921	-0.002638	-0.001684	-0.001416	-0.002402	-0.002489	-0.001738

APPENDIX D Continued.

stable equivalent to original population  
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age	total	stockh.	east-mid	south/mid	south	west	n.-middl	l.-north	up-north
0	547488.	86947.	91584.	50028.	82810.	120290.	52653.	24378.	38797.
5	554628.	84110.	92517.	51319.	83634.	120851.	55594.	25959.	40645.
10	564541.	83378.	93787.	52768.	85499.	122256.	57606.	27263.	41984.
15	574239.	87784.	94798.	53132.	87866.	124568.	57879.	27104.	41107.
20	583380.	99251.	95721.	51238.	89653.	127282.	55996.	25565.	38673.
25	592413.	106982.	96548.	49893.	89645.	129437.	56001.	25542.	38365.
30	601136.	107151.	97370.	51024.	89613.	130418.	58444.	27064.	40050.
35	609069.	106055.	98159.	52364.	91120.	131044.	60501.	28308.	41519.
40	615463.	104935.	98435.	53076.	93130.	132264.	62093.	29298.	42232.
45	618931.	103780.	98538.	53597.	94619.	132954.	63017.	30018.	42408.
50	617680.	102092.	98389.	54063.	94940.	132421.	63441.	30232.	42100.
55	609331.	98858.	97308.	53855.	94339.	130634.	63213.	30057.	41067.
60	590302.	93042.	94398.	52690.	92616.	126866.	61921.	29355.	39414.
65	553115.	84826.	88419.	50023.	88034.	119295.	58642.	27510.	36368.
70	488967.	73739.	78100.	44702.	78986.	105959.	51879.	24144.	31458.
75	391643.	58721.	62018.	36121.	64323.	85764.	41068.	19057.	24571.
80	266597.	40141.	41472.	24778.	45091.	59118.	27175.	12604.	16218.
85	190973.	30659.	28851.	17906.	33863.	42135.	17698.	8774.	11087.
total	9569897.	1552452.	1546411.	852577.	1479783.	2073556.	964820.	452234.	648063.

percentage distribution

age	total	stockh.	east-mid	sout/mid	south	west	n.-middl	l.-north	up-north
0	5.7209	5.6006	5.9223	5.8679	5.5961	5.8012	5.4573	5.3905	5.9866
5	5.7956	5.4179	5.9827	6.0193	5.6518	5.8282	5.7621	5.7402	6.2717
10	5.8991	5.3707	6.0648	6.1892	5.7778	5.8959	5.9707	6.0286	6.4784
15	6.0005	5.6546	6.1302	6.2320	5.9377	6.0075	5.9989	5.9934	6.3431
20	6.0960	6.3932	6.1899	6.0098	6.0586	6.1383	5.8038	5.6531	5.9674
25	6.1904	6.8912	6.2433	5.8520	6.0580	6.2423	5.8043	5.6480	5.9200
30	6.2815	6.9021	6.2965	5.9846	6.0558	6.2896	6.0575	5.9846	6.1800
35	6.3644	6.8314	6.3475	6.1419	6.1577	6.3198	6.2707	6.2596	6.4066
40	6.4312	6.7593	6.3654	6.2254	6.2935	6.3786	6.4357	6.4785	6.5166
45	6.4675	6.6849	6.3721	6.2865	6.3941	6.4119	6.5315	6.6377	6.5439
50	6.4544	6.5762	6.3624	6.3412	6.4158	6.3862	6.5754	6.6850	6.4964
55	6.3672	6.3678	6.2925	6.3167	6.3752	6.3000	6.5518	6.6463	6.3369
60	6.1683	5.9932	6.1043	6.1800	6.2588	6.1183	6.4179	6.4911	6.0819
65	5.7797	5.4640	5.7177	5.8672	5.9491	5.7531	6.0780	6.0832	5.6118
70	5.1094	4.7498	5.0504	5.2432	5.3377	5.1100	5.3771	5.3388	4.8541
75	4.0924	3.7824	4.0105	4.2367	4.3468	4.1361	4.2565	4.2141	3.7914
80	2.7858	2.5856	2.6818	2.9063	3.0471	2.8510	2.8166	2.7870	2.5025
85	1.9956	1.9749	1.8657	2.1002	2.2884	2.0320	1.8343	1.9402	1.7108
total	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000
m.ag	41.3992	41.1780	40.9437	41.4082	42.0597	41.3617	41.8837	42.0194	40.4619
sha	100.0000	16.2222	16.1591	8.9090	15.4629	21.6675	10.0818	4.7256	6.7719
lam	0.981074	0.981041	0.981040	0.981088	0.981122	0.981123	0.981034	0.981030	0.981041
r	-0.003821	-0.003828	-0.003828	-0.003819	-0.003812	-0.003811	-0.003830	-0.003830	-0.003828



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