MIGRATION AND SETTLEMENT:
5. NETHERLANDS

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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 the 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 focuses on migration and settlement in the Netherlands. Professor Paul Drewe, of the Department of Architecture and Urban Planning, Delft University of Technology, has been studying multiregional population dynamics and population distribution policy on the level of the five geographic regions which form the framework for physical and regional economic planning in the Netherlands. In this report he describes some of his recent findings.

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

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1 INTRODUCTION

In 1965, it was estimated that the population of the Netherlands in the year 2000 would be 20 million. Eleven years later, this estimate had dropped to 14.3 million. The country is obviously going through a process of vital transition marked by a decline in birth rates, though the extent of future fertility decline is still uncertain. Despite the fact that fertility has dropped below bare replacement level from 1973 onward, the Dutch population, being rather "young," has a built-in momentum for further growth. Whether international migration will continue to contribute to population growth is highly uncertain. Recent estimates vary between net immigration and net emigration.

On the regional level, the influence of internal (net) migration on total population growth has been increasing over the years, compared to the impact of natural increase. A mobility transition has occurred. The western part of the Netherlands has become the only "loser," as far as internal net migration is concerned. The migration balance, both of regions bordering the West and of peripheral regions, has increased at the expense of the highly urbanized West region. The influence of economic factors on migration (aggregated on the provincial level) has declined, whereas the importance of social factors has tended to increase. Social factors are linked with the provision of social infrastructure, including housing, and with the natural environment. Migration within commuting range (residential migration that induces extensive commuting), especially from the West region into the adjacent provinces of the South and East regions, has played an important part in the process; this has induced policy makers to advocate a policy of containment, which implies positive interventions in favor of the western provinces and negative interventions in the southern and eastern provinces. These interventions are quantified, and the preparation of the population distribution policy is based on a hybrid demographic approach. In the sections that follow an attempt is made to demonstrate the performance

of a systems approach to multiregional population analysis in relation to this population distribution policy.

Section 2 provides background information on patterns of spatial population change in the Netherlands. This includes an overview by region as well as a description of the components of change. In presenting the multiregional population analysis in Section 3, attention is directed at data, a multiregional life table, fertility and mobility analyses, the implications of current demographic behavior, and shrinking exercises. Section 4, on population distribution policy, covers changes in professed policy intentions, the relation between distribution policy and multiregional population analysis, and a discussion of policy effectiveness. The concluding section of the report (Section 5) emphasizes, once again, the relation between multiregional population analysis and population distribution policy in the Netherlands.

2 CURRENT PATTERNS OF SPATIAL POPULATION GROWTH

We begin with a descriptive analysis of recent changes in spatial population growth and of the underlying demographic forces. First, we review changes in population distribution by region, including a short discussion of regional disaggregations. Second, the contribution to spatial population change of regional fertility levels, regional mortality levels, and internal and international migration are described in some detail.

2.1 Overview

When describing patterns of spatial population change, we focus on the *geographic regions* ("landsdelen"), which refer to groups of provinces. The eleven provinces of the Netherlands have been aggregated into five geographic regions: namely, the North, East, West, South-West, and South (see Figure 1).

The most striking feature of spatial population growth is the shift in regional shares of population over the last 27 years (see Table 1). The share of the densely populated West region of the Netherlands has shrunk, between 1950 and 1977, from 48 to 45% of the total population. Major "winners" have been the South and East regions, which have a lower population density than the national average. The more sparsely populated North and South-West started the period as "losers," but have tended to maintain their share between the years 1970 and 1977; the share of the North region has in fact slightly increased in recent years. Note that changes in population distribution by component province may deviate from the trend revealed at the level of geographic regions.

A short discussion of the regional disaggregation adopted for this study is in order. In the regional hierarchy of the Netherlands (see Figure 2), geographic regions are second in rank (level 1). They are neither part of the three-tier political system which is represented by levels 0, 2, and 3, nor do they correspond

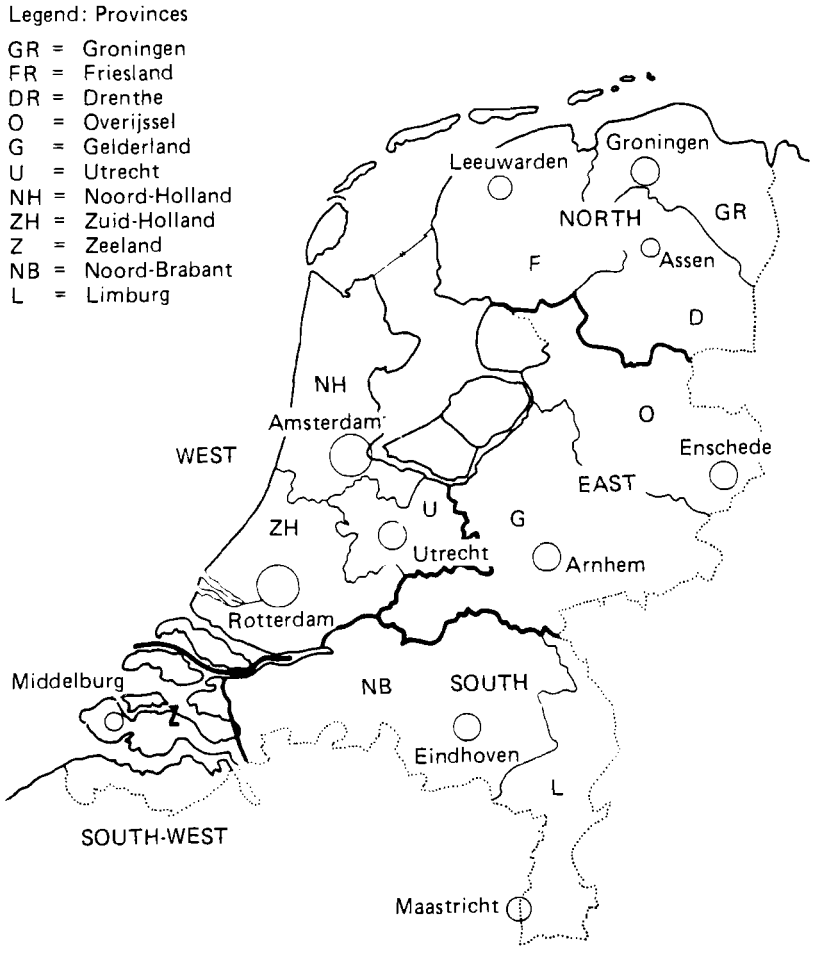


FIGURE 1 Regional demarcation of the Netherlands: provinces and geographic regions.

to uniform or functional regions.* Recent research in the Netherlands has shown that, in delineating functional regions, it is advisable to take into account the interdependence of commuting, migration, and job-site relocation (Nederlands Economisch Instituut 1977; Verster and de Langen 1978). This approach emphasizes functional relations between the West and the adjacent provinces of Noord-Brabant in the South and Gelderland in the East (cf. Figure 1). It allows for a distinction between migration within and migration beyond commuting range (intra- as opposed to interregional migration).

*Examples of uniform or functional regions include the 40 regions ("C.O.R.O.P.-gebieden") and the 129 economic–geographic areas ("economisch–geografische gebieden").

TABLE 1 Population (X 1,000) and population density (per km²), 1950–1976: five geographic regions and eleven provinces.

Geographic region/ province	1950[a]			1960[a]			1970[a]			1977[a]		
	Population	% of total	Density	Population	% of total	Density	Population	% of total	Density	Population	% of total	Density
North	1,206	12.1	149	1,264	11.1	156	1,406	10.9	169	1,520	11.0	183
Groningen	460	4.6	205	475	4.2	211	517	4.0	225	544	3.9	234
Friesland	465	4.7	144	478	4.2	148	522	4.1	154	566	4.1	169
Drenthe	281	2.8	107	311	2.7	119	367	2.8	138	410	3.0	155
East	1,747	17.5	200	2,067	18.1	236	2,442	18.8	248	2,687	19.5	275
Overijssel	670	6.7	180	799	7.0	213	921	7.1	242	993	7.2	261
Gelderland[b]	1,077	10.8	215	1,268	11.1	253	1,521	11.7	254	1,694	12.3	284
West	4,803	48.0	709	5,430	47.6	801	6,014	46.4	882	6,223	45.0	908
Utrecht	573	5.7	433	677	5.9	511	801	6.2	603	874	6.3	658
Noord-Holland	1,847	18.5	701	2,055	18.0	781	2,244	17.3	843	2,299	16.6	866
Zuid-Holland	2,383	23.8	844	2,698	23.7	958	2,969	22.9	1,048	3,050	22.1	1,063
South-West												
Zealand	269	2.7	160	284	2.5	166	306	2.4	175	336	2.4	188
South	1,971	19.7	277	2,367	20.7	332	2,786	21.5	393	3,047	22.1	430
Noord-Brabant	1,243	12.4	253	1,485	13.0	303	1,788	13.8	363	1,991	14.4	405
Limburg	728	7.3	329	882	7.7	398	999	7.7	460	1,056	7.7	487
Total	9,996	100.0	308	11,412	100.0	351	12,954	100.0	383	13,813	100.0	409

[a] Data for January 1 of each year.
[b] Including the Southern Ysselmeerpolders.

SOURCE: Central Bureau of Statistics.

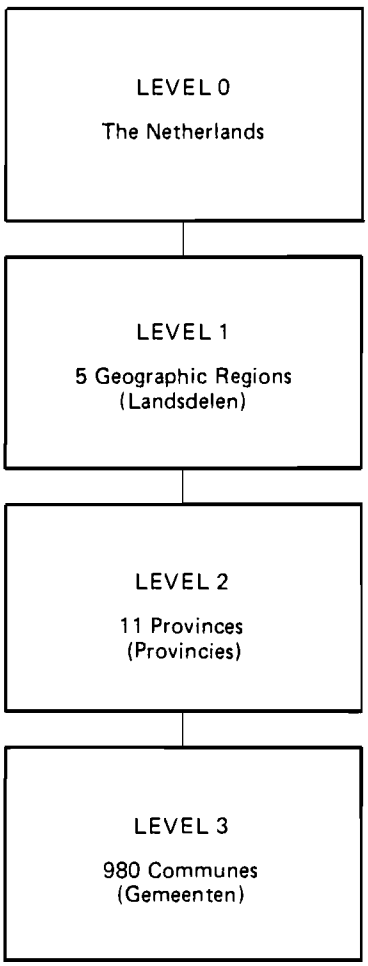


FIGURE 2 The regional hierarchy of the Netherlands.

Geographic regions have been mainly used in physical planning to summarize spatial trends and policy response, and in regional economic planning as a framework for discussing spatial inequality and distribution policy. Hence we are applying a regional disaggregation of some political (planning) relevance, that is convenient for displaying patterns of spatial population change, multiregional population analysis, and population distribution policy. However, geographic regions can only act as a starting point for the study of migration and settlement in the Netherlands.

It is well known that lowlands, reclaimed from the sea, account for territorial changes in the Netherlands. These changes are not dealt with explicitly

in the present study as the Southern Ysselmeerpolders* are included in the East region.

2.2 *Components of Spatial Population Change*

In this section we begin by describing changes in population distribution by geographic region, and then go on to discuss the underlying demographic components of change. Such components, for the period 1950–1976, are set out in Table 2. The influence of natural increase on total population growth from internal sources has declined over the period studied, in all geographic regions. As a correlate, the relative contribution of internal net migration has increased. This is reflected in the ratio between natural increase and internal population growth given in column *4*. In the West, which tends toward net out-migration, this ratio has grown over the period studied. In the regions which tend toward net in-migration (the rest of the country), the ratio has diminished.

Table 2 also provides a context for the year 1974, the base-year of the multiregional population analysis. The ratios shown in column *4* for the year 1974 are close to the average for the period 1970–1976, except for the West region. This exception is due to the fact that the West experienced a small population loss from internal sources in 1974, because the natural increase no longer compensated for net out-migration. A comparison between the base-year and the period 1970–1976 in terms of external net migration is not meaningful here, since we have decided to remove uncertain international influences from the multiregional population analysis. However, the impact of external migration on spatial population change will be described separately.

In order to analyze the components of spatial population change in greater detail, we will examine successively regional fertility levels, regional mortality levels, and internal and international migration.

2.2.1 REGIONAL FERTILITY LEVELS

Crude birth rates range from a maximum of 15.1 per thousand in the East to a minimum of 12.9 per thousand in the West (Table 3). Fertility in the North region is comparable with that in the East. A medium level of fertility is found in the South-West and in the South. But even the highest fertility level found no longer guarantees replacement. The net reproduction rate is smaller than unity in all regions, though the North, the East, and the South-West are nearer to unity (replacement level) than are the South and the West (Table 3).

In order to shed more light on regional differences, we examine the age structure of fertility. The Dutch pattern of age-specific regional fertility in 1974 is shown in Figure 3 and Appendix B. The peak of the fertility curve is

*The population of this area amounts to a little more than 10,000, and its total land area to 664 km^2 (January 1, 1974).

TABLE 2 Components of change, 1950–1976: average annual changes (× 1,000) by geographic region.

Geographic region	Period	Natural increase *1*	Internal net migration *2*	Total internal population growth *3*	*Ratio 1:3* *4*	External net migration *5*	Total population growth[a] *6*
North	1950–1959	16.2	−8.1	8.1	*2.0*	−2.7	5.8
	1960–1969	15.7	−1.7	14.0	*1.1*	0.2	14.2
	1970–1976	10.3	4.8	15.1	*0.7*	1.3	16.4
	1974	8.5	7.4	15.9	*0.5*	1.3	17.1
East[b]	1950–1959	29.5	2.6	32.1	*0.9*	−0.9	32.2
	1960–1969	31.1	5.6	36.7	*0.8*	2.0	37.2
	1970–1976	21.3	9.5	30.8	*0.7*	4.5	35.1
	1974	18.6	11.6	30.2	*0.6*	4.6	34.8
West	1950–1959	62.8	7.5	70.3	*0.9*	−7.5	62.7
	1960–1969	59.4	−5.6	53.8	*1.1*	5.1	58.8
	1970–1976	33.5	−24.0	9.5	*3.5*	21.5	29.8
	1974	27.2	−31.7	−4.5	*6.0*	22.8	16.7
South-West	1950–1959	3.0	−1.6	1.4	*2.1*	< −0.1	1.5
	1960–1969	2.7	−0.5	2.2	*1.2*	< 0.1	2.2
	1970–1976	1.8	1.9	3.7	*0.5*	0.6	4.3
	1974	1.5	2.0	3.5	*0.4*	0.2	3.7
South	1950–1959	39.2	2.2	41.4	*0.9*	−2.1	40.2
	1960–1969	38.8	2.6	41.4	*0.9*	1.3	41.9
	1970–1976	23.8	8.0	31.8	*0.7*	5.4	37.2
	1974	20.9	10.7	31.6	*0.7*	4.4	36.0
Total	1950–1959	150.7	2.6[a]	153.3	*1.0*	−13.2	142.4
	1960–1969	147.7	0.4[a]	148.1	*1.0*	8.6	154.3
	1970–1976	90.7	0.2[a]	90.9	*1.0*	33.3	122.8
	1974	76.7	0	76.7	*1.0*	33.3	108.3

[a] Including administrative and boundary corrections.
[b] Including the Southern Ysselmeerpolders.

SOURCE: Central Bureau of Statistics.

TABLE 3 Crude birth rate, net reproduction rate, crude death rate, and expectation of life at birth, 1974: five geographic regions.

Geographic region	Crude birth rate	Net reproduction rate	Crude death rate	Expectation of life at birth[a]
North	0.0146	0.95	0.0089	74.7
East	0.0151	0.96	0.0079	74.4
West	0.0129	0.79	0.0085	75.1
South-West	0.0140	0.95	0.0093	75.7
South	0.0139	0.84	0.0068	74.0
Total	0.0138	0.85	0.0081	74.7

[a]The expectation of life is calculated from the mortality schedule of the region only. Migration is not taken into account. The net reproduction rate is based on the fertility schedule of the region and on the single-region life table.

attained between ages 25 and 29 in all geographic regions. The highest fertility rate between ages 25 and 29 is found in the East (79 per thousand) and the lowest in the West (65 per thousand), which correspond, respectively, to the maximum and minimum of crude birth rates.

2.2.2 REGIONAL MORTALITY LEVELS

Crude death rates range from a minimum of 68 per thousand in the South to a maximum of 93 per thousand in the South-West (see also Table 3). Rates in the North and West regions are close to 9 per thousand, whereas the East shows a medium level of mortality. Overall mortality is expressed by $e(0)$, the expectation of life at birth. There is little regional variation, with $e(0)$ lying in the range 74.0 years (South) to 75.7 years (South-West), as shown in Table 3.

As far as the age structure of mortality is concerned, observed regional schedules are presented in Figure 4 and Appendix B. The age pattern of mortality can be considered as normal. Starting from around 2.5 per thousand for ages 0–4, a minimum is reached for ages 10 through 14, varying from 0.23 (West) to 0.41 (South-West) per thousand. The same level of mortality as occurs during infancy is reached again somewhere between the ages of 40 and 49. Maximum mortality, at ages 85 and older, ranges from 182 per thousand in the South-West to 199 per thousand in the East.

2.2.3 INTERNAL MIGRATION

Since migration is defined as a crossing of a regional boundary, one might expect the level of migration rates to be influenced by the level of regional disaggregation. In order to investigate the effect of spatial aggregation on age-specific

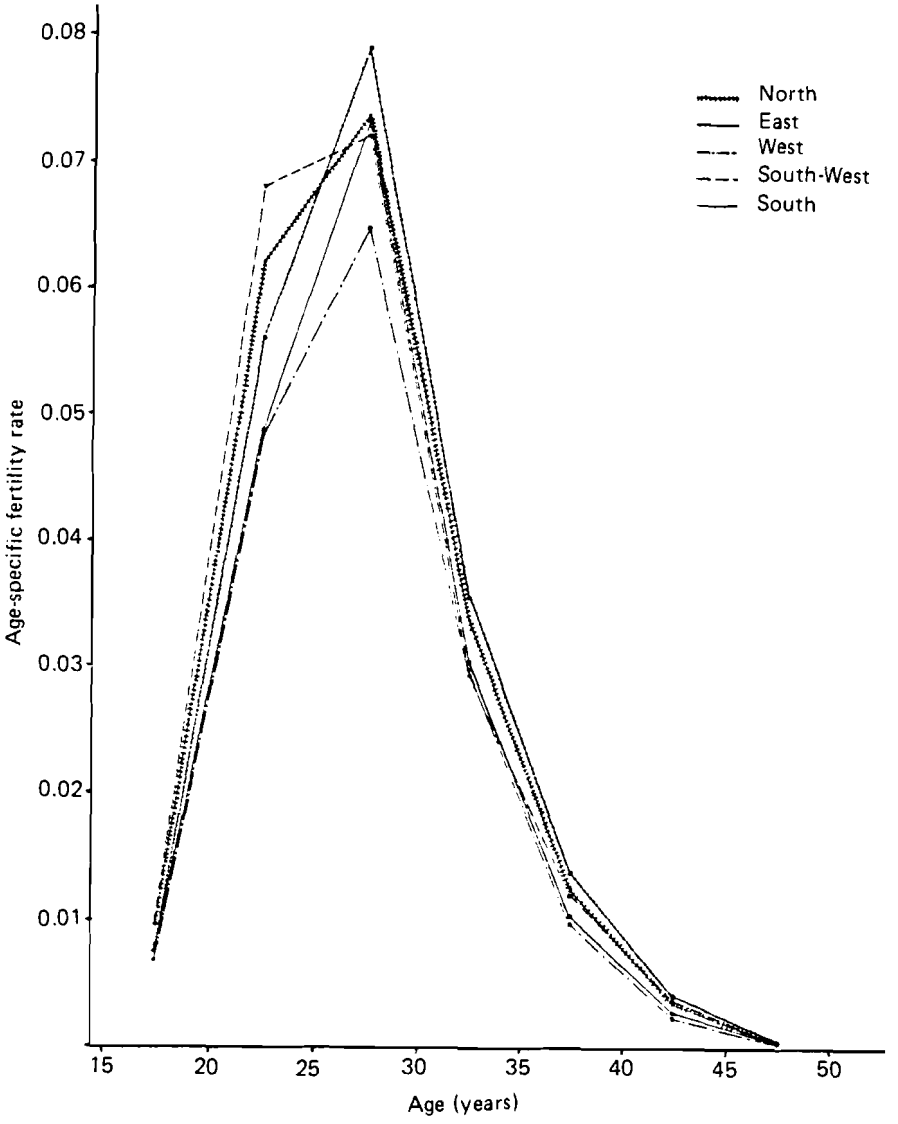
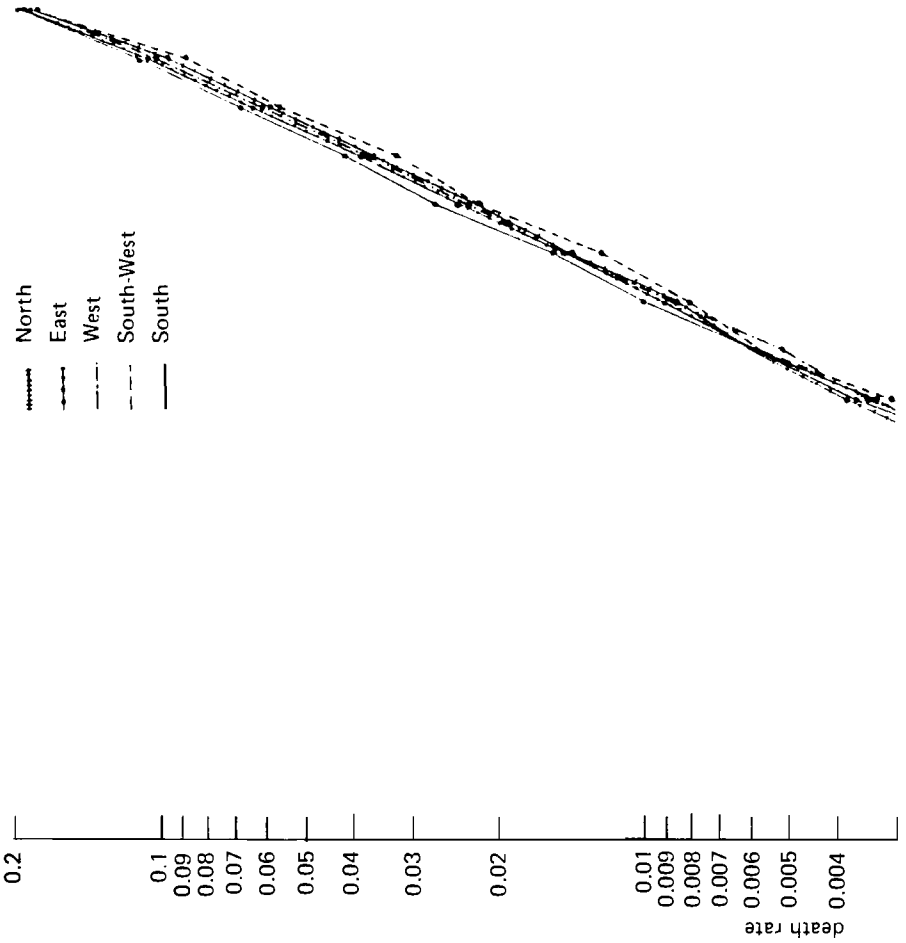


FIGURE 3 Observed fertility schedules in the Netherlands, 1974: five geographic regions.

migration rates, overall rates have been calculated, not only for the five-region case adopted for this study, but also for a higher level (the two-region case of the West and the rest of the Netherlands) and for two lower levels of aggregation (namely, the 11 provinces and the 834 communes). Comparing the various curves in Figure 5, we note that the higher the level of spatial aggregation, the lower the level of migration rates. The highest level pertains to inter-commune rates, and the lowest to migration to and from the capital region of the West. We also note that the shape or profile of the migration curves is independent of the


North
East
West
South-West
South
0.2
0.1
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0.009
0.008
0.007
0.006
0.005
0.004
death rate

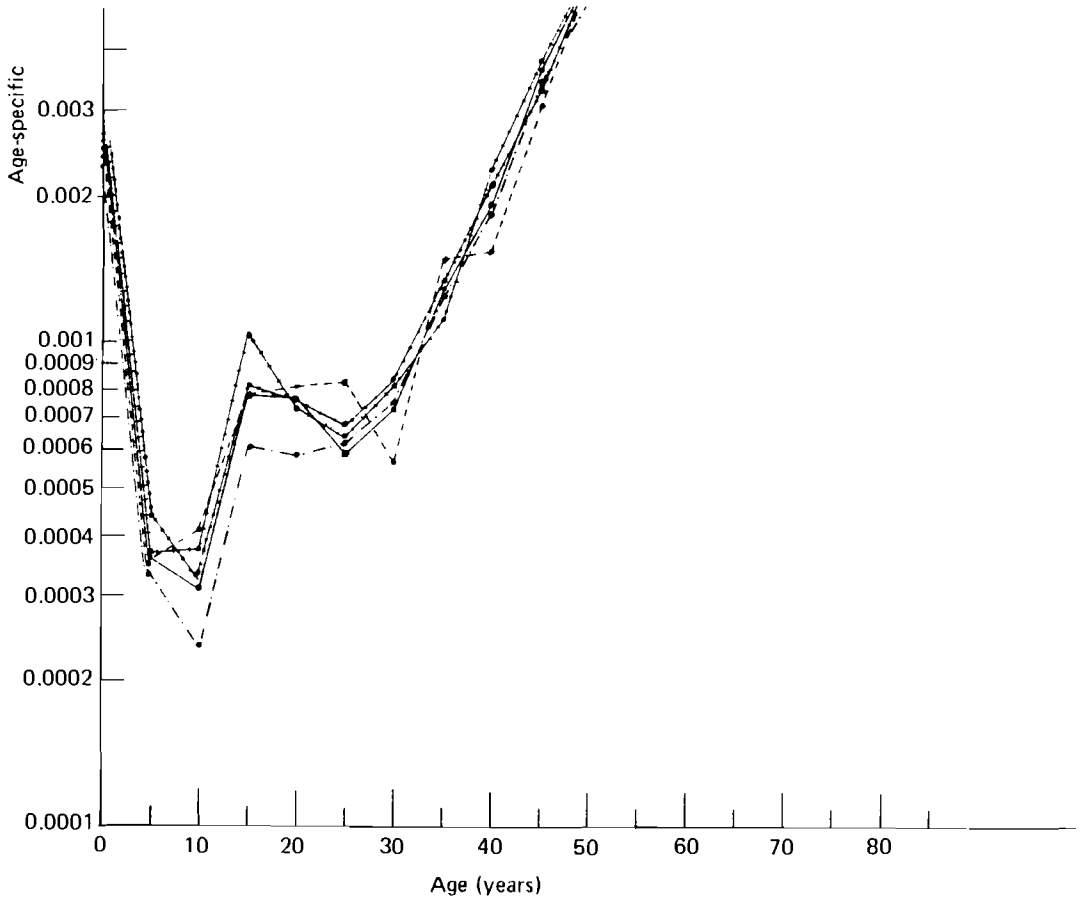


FIGURE 4 Observed mortality schedules in the Netherlands, 1974: five geographic regions.

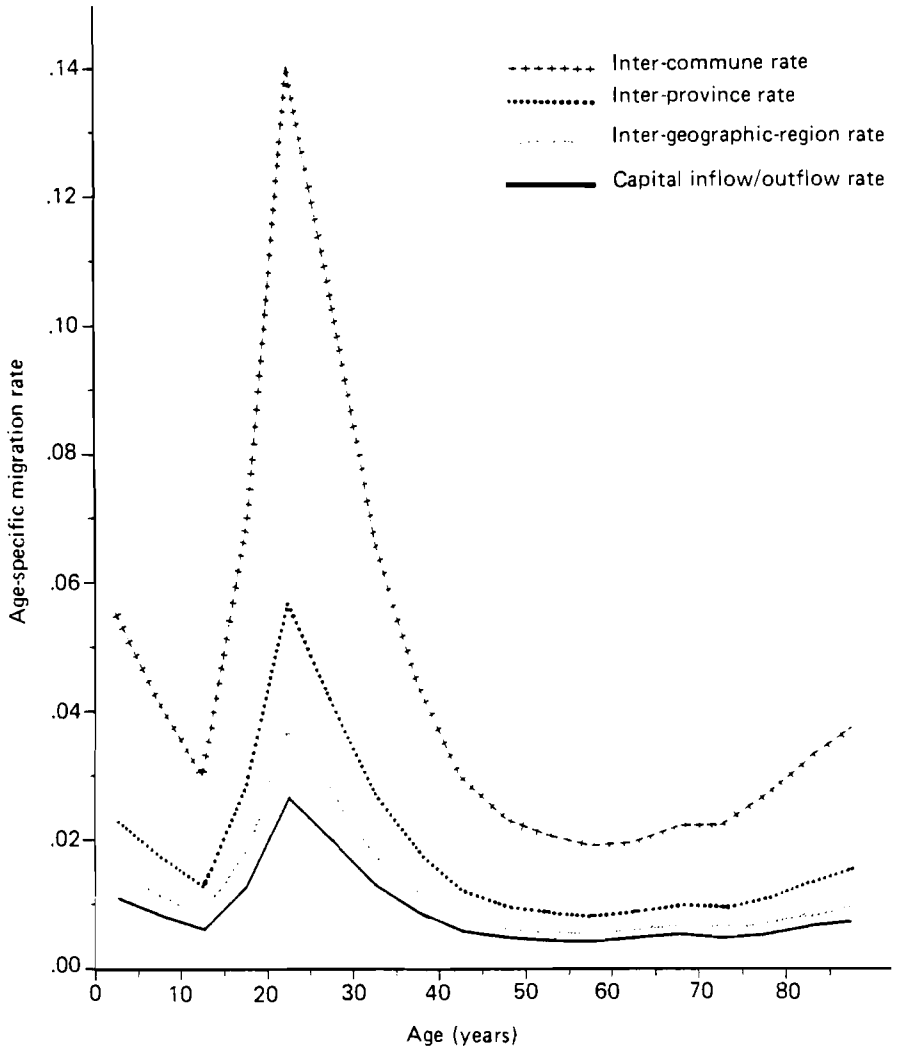


FIGURE 5 Age-specific migration rates in the Netherlands, 1974: four different levels of aggregation.

regional disaggregation. All the curves show a high peak between ages 20 and 25, and a low point between ages 10 and 15. In addition, all the curves show a similar turning point in migration rates, somewhere between the ages of 55 and 60.

For further discussion of the age structure of internal migration we concentrate on the level of the geographic regions. Figure 6 and Appendix B present the age pattern of migration in terms of 5-year age intervals referring to total out-migration rates. It seems important to highlight both the general age profile and

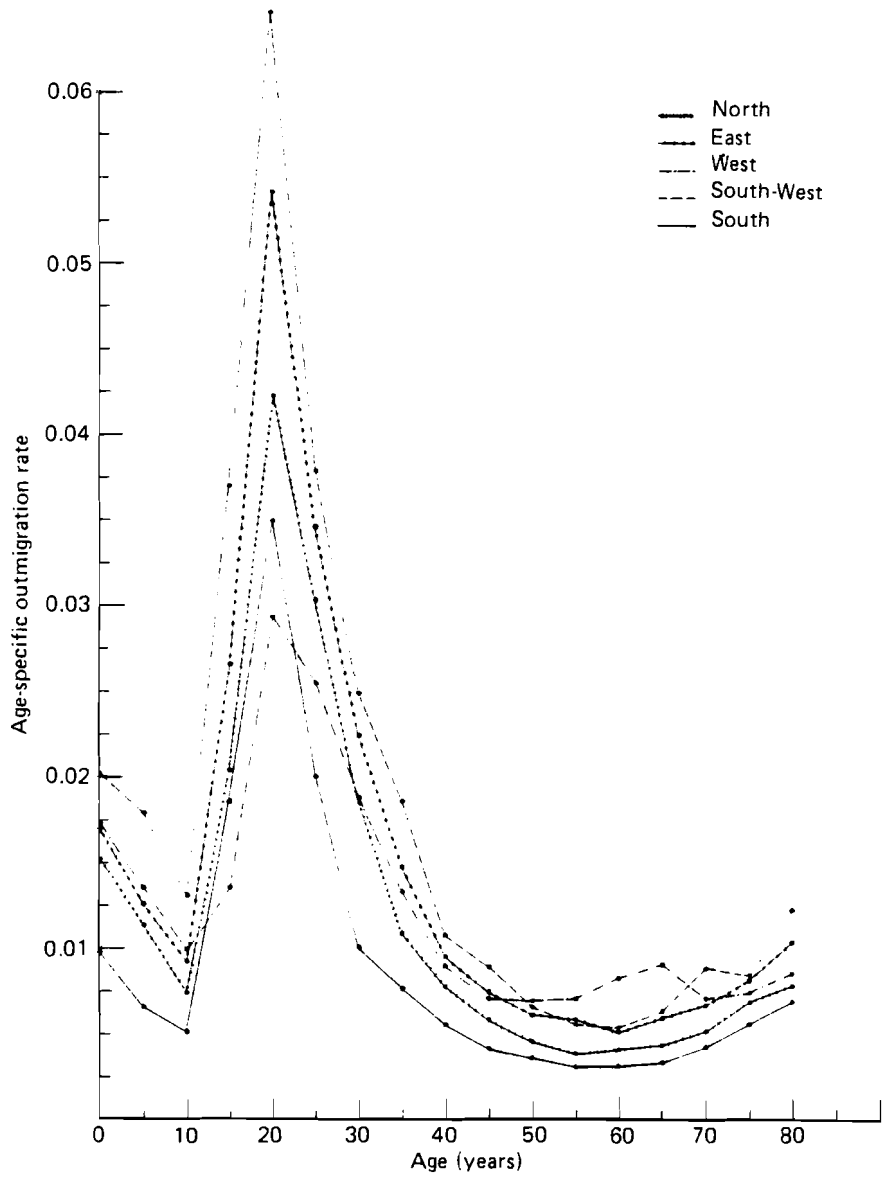


FIGURE 6 Observed out-migration schedules in the Netherlands, 1974: five geographic regions.

its regional variations (minimum and maximum migration rates). Four stages in the life-cycle can be distinguished: children, young teenagers, young adults, and the elderly (in retirement). Out-migration rates among children (0 to 4 years of age) are rather high, varying from 9.7 per thousand in the South to 21.1 per thousand in the South-West. Young teenagers, from 10 through 14 years of age,

show the lowest migration rates (5.1 per thousand in the South, and 13.2 in the South-West). Young adults (20–24 years) present the highest peak, with a minimum of 29.3 migrants per thousand in the West and a maximum of 64.6 per thousand in the South-West. As far as the elderly are concerned, most regions show a common turning point in migration rates. After gradually declining from the young-adult peak, out-migration slowly increases from the age of 55 onward in the North and in the South (and from the age of 60 in the East region). In the West region, on the other hand, we notice a slight increase between 50 and 74 years of age, whereas the South-West shows a slight increase between the ages of 60 and 79.

What is the main reason for these regional differences? Let us concentrate on the main outflow (migration from the West to the rest of the Netherlands) and the main inflow (migration from the rest of the Netherlands to the West) as shown in Figure 7. The West, being the most developed region economically, exerts a strong attraction for age groups that are just entering the labor force (see the high peak in Figure 7). Out-migrants from the West region, mainly young families with children, react favorably to the housing opportunities and natural environment amenities outside the capital region. Those moving to places within commuting range are able to profit not only from the residential utility of areas outside the region, but also from the job-site utilities inside the capital region. The retirement peak shown in Figure 7 for migrants around the age of 65 reflects the fact that the rest of the Netherlands offers more attractions for retired people than does the West.

2.2.4 INTERNATIONAL MIGRATION

The Netherlands experienced a net emigration during the period 1950–1959, but has become a country of net immigration in recent years, mainly due to immigration from the Mediterranean countries and from Surinam prior to its independence (see Table 2). The average annual increase of 33.3 thousand witnessed over the period 1970–1976 is unlikely to continue in the future. However, the past influence of international migration on spatial population change is worth noting. In recent years, the bulk of foreign net immigration has concentrated in the western part of the Netherlands. From 1960 onward, external net migration into the West has nearly compensated for the losses incurred from internal migration (Table 2). The regional distribution of foreign workers and their families in the Netherlands corresponds to the general pattern observed in other member countries of the European Economic Community in the nineteen-sixties (Drewe 1978a).

3 MULTIREGIONAL POPULATION ANALYSIS

This section focuses on the joint impact of components of spatial population change in an interconnected system of regions (Rogers 1975). We begin with an extensive discussion of the data input. Next, a multiregional life table is applied

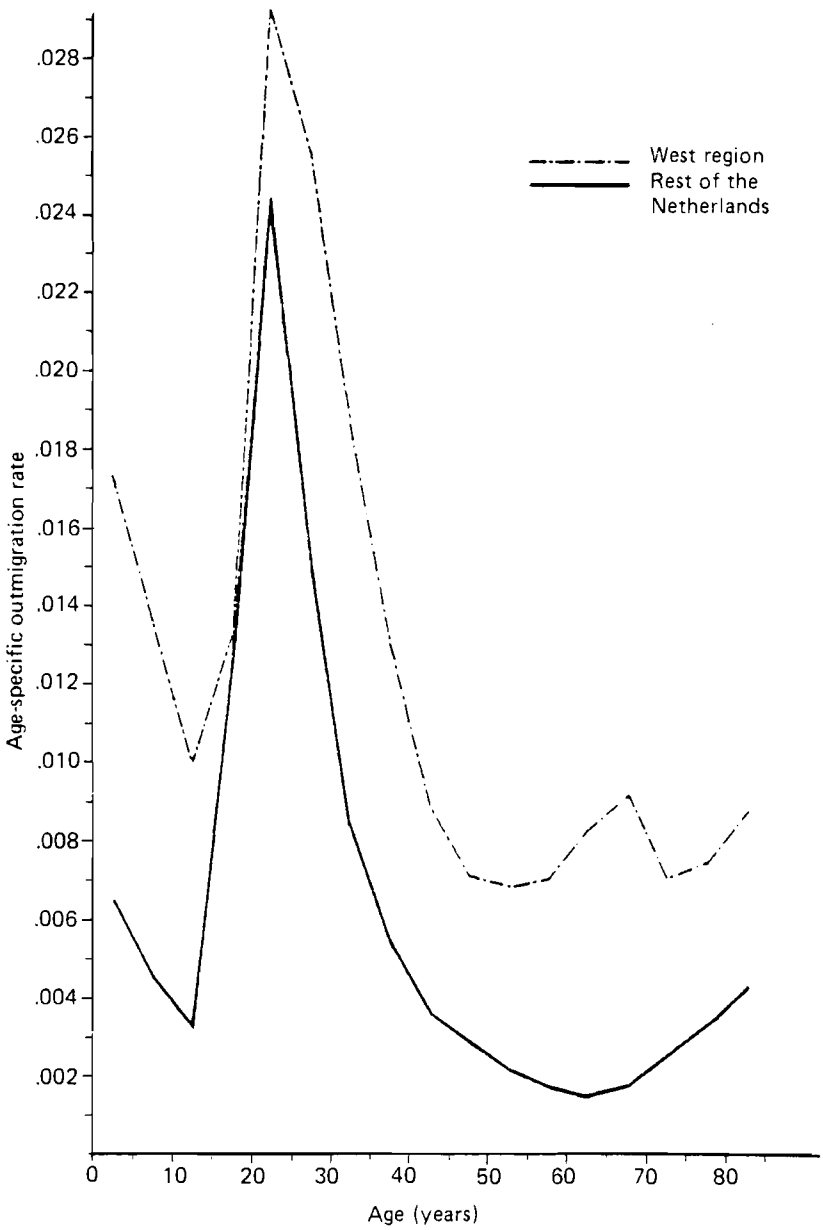


FIGURE 7 Observed out-migration schedules in the Netherlands, 1974: the West and the Rest.

to describe several basic demographic features of a multiregional population, followed by a fertility and mobility analysis. We also deal with the medium- and long-term implications of current (base-period) demographic behavior and include an alternative fertility scenario. Finally, an attempt is made to assess the impact of different regional delineations on the projection of a multiregional population through so-called shrinking exercises.

3.1 Data

Input data for the multiregional population analysis are derived from the population register. Vital statistics and migration data, available at the municipality level and aggregated to provinces by the Central Bureau of Statistics ("Centraal Bureau voor de Statistiek") have been further aggregated to the level of the geographic regions. As regards migration data, movers (migrating families or single persons) receive a special card ("verhuiskaart") from the municipality of origin, which they are requested to fill in and to hand over to the municipality of destination. After registration, the card is returned to the municipality of origin, and from there it is passed on to the Central Bureau of Statistics. These cards contain background information on age and nationality among other details. However, this information is not published regularly for migration flows. Because data on age-specific interprovincial flows were not published for 1974 they have been estimated and then aggregated to age-specific flows between geographic regions. From the available data, consisting of the flow matrix of the total population and the age composition of the arrivals and departures of each province, a so-called three-face problem had to be solved, using the approach developed by Willekens (1977a) (see also Willekens *et al.* 1979). The results of the estimation procedure are discussed in Drewe and Willekens (1980).

Note that an unknown fraction of the internal migrants are former immigrants. Once they have entered the Netherlands, they are no longer reported as foreigners.

The regional delineation of geographic regions used for the analysis has already been discussed in Section 2.1. The input data for the multiregional analysis are shown in Appendix A. The data for the 11 provinces, from which the geographic regions are aggregated, are given in Appendix F.

3.2 The Multiregional Life Table

In constructing a multiregional life table, our analysis shifts from components (as described in Section 2.2) to the multiregional population system. There are various ways of analyzing the interaction of components, e.g., in terms of probabilities. Five-year transition probabilities have been computed from the mortality and out-migration rates (Willekens and Rogers 1978). The probabilities, which are shown in Appendix C, form the basis from which all other life-table statistics are derived. For instance, the probabilities that individuals born in

TABLE 4 Probabilities of surviving to exact age 20.

Region of residence	Region of birth				
	North	East	West	South-West	South
North	0.75194	0.05715	0.04239	0.02141	0.01366
East	0.09504	0.71742	0.09036	0.05509	0.05821
West	0.10137	0.13199	0.76681	0.17605	0.09102
South-West	0.00338	0.00531	0.01187	0.62839	0.00986
South	0.02708	0.06771	0.07068	0.09926	0.80758
Total	0.97880	0.97958	0.98211	0.98020	0.98034

TABLE 5 Number of years lived in each region between ages 20 and 25 by a unit birth cohort.

Region of residence	Region of birth				
	North	East	West	South-West	South
North	3.41737	0.34403	0.25019	0.13733	0.09411
East	0.57804	3.20487	0.52613	0.34426	0.37166
West	0.68443	0.87991	3.64175	1.11316	0.63145
South-West	0.02280	0.03506	0.06809	2.70808	0.06243
South	0.18237	0.42501	0.41660	0.58895	3.73287
Total	4.88501	4.88888	4.90276	4.89179	4.89251

region i will be in region j at age 20 can easily be obtained and these are given in Table 4. The total probabilities of surviving to age 20 reveal only minor regional variations which, given our analysis of regional mortality levels, is not surprising. But there are considerable regional differences in age-specific migration. The probability that an individual born in the South-West will still be in the same region at age 20 is low (0.63) compared to the corresponding values for the other regions, especially the South (0.81). Of course, the probability of staying in the region of birth is generally higher than that of moving to any other region. The second most-probable region of residence at age 20, for movers from the rest of the Netherlands, is the West (with a probability of 0.09 or more). Movers from the West are most likely to settle in the adjacent East and South regions. Thus the dominant pattern of inflow and outflow (cf. Section 2.2) is also evident in these transition probabilities. The same probabilities can be expressed in terms of durations of residence $[{}_{i0}e_j(20)]$. Table 5 shows that a person born in the West and now at age 20 may be expected, on average, to live

TABLE 6 Expectations of life at birth.

Region of residence	Region of birth				
	North	East	West	South-West	South
North	44.7632	6.5201	5.2495	3.2963	2.4972
East	11.0053	42.0864	10.3253	7.3063	7.4819
West	13.0197	15.6797	48.5218	18.1411	11.8098
South-West	0.6533	0.8920	1.4332	34.5281	1.3037
South	5.1564	9.3317	9.2801	11.5541	51.2457
Total	74.5978	74.5099	74.8099	74.8259	74.3383

4.90 years between the ages of 20 and 25; with 3.64 years to be spent in the region of birth, and the remainder subdivided between the regions as follows: 0.53 years in the East, 0.42 years in the South, 0.25 years in the North, and 0.07 years in the South-West.

Life-table statistics also tell us something about expectations of life at birth, i.e. about the average lifetime an i-born person may expect to live in region j $[{}_ie_j(0)]$. In Table 6 the kind of information given in Table 5 is extended to the life span of a birth cohort. On the average, the Dutch have an expectation of life of between 74 and 75 years. Note the differences between the column sums in Table 6 and the expectations of life given in Table 3. The total expectations of life in Table 6 are derived from a multiregional life table, and include therefore the impact on $e(0)$ of residence in regions with different mortality patterns.

There are considerable regional differences with regard to the fraction of lifetime an individual may expect to live in the region of birth. A person born in the West, for example, may expect to live about 65% of his life in the West region. Next in line comes the East region in which a person born in the West may expect to live about 14% of his lifetime, followed by the South with 12%. Only a person born in the South may expect to live longer in the region of birth (about 69%) than one born in the West. The fraction of lifetime spent in the home region amounts to 60% in the North and 56% in the East. Only those born in the South-West spend less than half of their lives (46%) in their home region. For those born in the rest of the Netherlands, the West region is, once again, the single most important destination, this time in terms of average lifetime. Appendix D contains the complete list of expectations of life by region of birth and region of residence.

Survivorship proportions by region of residence are another way of presenting the combined influence of migration and mortality behavior. Table 7 shows the proportion of people aged 20–24 in region i who survive to age 25–29 in region j, 5 years later $[s_{ij}(20)]$. Both the overall and the regional patterns, described earlier, repeat themselves in these survivorship and out-migration proportions.

TABLE 7 Survivorship proportions of persons aged 20–24 years.

	Region of origin (i)				
Region of destination (j)	North	East	West	South-West	South
North	0.83048	0.03757	0.02242	0.01102	0.00797
East	0.06803	0.79310	0.05436	0.03197	0.04134
West	0.07844	0.11061	0.87309	0.12836	0.07210
South-West	0.00235	0.00406	0.00745	0.76341	0.00783
South	0.01722	0.05109	0.03964	0.06127	0.86732
Total	0.99652	0.99644	0.99697	0.99604	0.99655

TABLE 8 Net reproduction rate matrix.

	Region of birth				
Region of residence	North	East	West	South-West	South
North	0.587408	0.079160	0.058543	0.034362	0.024940
East	0.138494	0.539469	0.124445	0.085700	0.091763
West	0.141766	0.177122	0.539729	0.212282	0.130390
South-West	0.006212	0.009107	0.015846	0.445054	0.015004
South	0.046067	0.095524	0.091498	0.123751	0.585310
Total	0.919947	0.900382	0.830062	0.901150	0.847408

3.3 Fertility and Mobility Analysis

Multiregional population analysis not only provides us with the multiregional life table, but also gives us a basis for calculating measures that summarize the effects of components of demographic change.

3.3.1 FERTILITY ANALYSIS

Regional fertility, regional mortality, and internal migration may be summarized by a net reproduction rate matrix (NRR) such as the one shown in Table 8. This rate has already been used earlier to describe regional fertility levels (see Table 3). As previously mentioned, in the Netherlands the total number of offspring born per person no longer guarantees replacement. This holds for all the geographic regions. The West and the South emerge as low-fertility regions compared to the rest of the Netherlands. We note that the introduction of regional fertility contributes more to regional variation in net reproduction rates than

TABLE 9 Net migraproduction rate matrix.

Region of residence	Region of birth				
	North	East	West	South-West	South
North	0.629964	0.073415	0.056888	0.033971	0.025002
East	0.158475	0.738566	0.146736	0.100620	0.105144
West	0.155364	0.189685	0.666193	0.223002	0.141165
South-West	0.009492	0.013437	0.023192	0.765149	0.021004
South	0.038398	0.075317	0.074536	0.096686	0.522139
Total	0.991693	1.090420	0.967545	1.219428	0.814455

does regional mortality. There is also a clear-cut difference between the South-West and the rest of the Netherlands with regard to the percentage of offspring per person staying in the region of birth: 49% of the total number of offspring in the South-West region as against 60% or more in the rest of the country.

3.3.2 MOBILITY ANALYSIS

Internal migration and regional mortality are summarized by the net migraproduction rate matrix (NMR). The column totals of Table 9 represent the expected number of migrations (crossings of boundaries of geographic regions) an individual makes during a lifetime. Individuals born in the South-West and in the East may expect to make more than one migration, as against the less than one migration expected in the rest of the Netherlands. To a large extent (between 63 and 69% with minor variations) these moves are expected to take place out of the geographic regions of birth. Moves out of other regions follow very much the same regional pattern as established earlier. Note that the calculation of NMRs is only one possible way of measuring mobility (or, more accurately, mobility expectancies) at the aggregate level.

3.4 Implications of Current Demographic Patterns of Change

The population of the five geographic regions has been projected ahead, assuming that the age curves of fertility, mortality, and internal migration observed in 1974 remain unchanged. Projection has proceeded in five-year time intervals equal to the age interval. In order to assess both medium- (1999) and long-term (stability) impacts, we focus on the composition of the population by region and by age.

3.4.1 COMPOSITION BY REGION

Leaving out external migration, the share of the West drops from 45.6% in 1974 to 39.9% in 1999 and to 33.4% in the long term (see Table 10). The rest of the Netherlands gains in this "zero-sum game" of regional shares. There are only minor population gains for the South-West, both in 1999 and at stability. Until 1999, the East and South regions will be the two major winners. If present trends continue beyond the year 1999, in the long term the East will preserve its leading position. The North, in the long term, will actually finish in second place, with the South region being relegated to the third rank (in terms of growth rates). The 4.3% increase of the North's share is the most surprising long-term implication of the 1974 age-specific rates, compared to the pattern of spatial population growth which has been observed over the last 27 years (see Tables 1 and 2), but we should remember that a stable population is just a hypothetical concept.

3.4.2 COMPOSITION BY AGE

The aging process can be described by comparing regional age compositions, as observed in 1974, with those projected for 1999 and with stable age compositions. Figure 8, parts a through e, seems at first sight to display a uniform pattern of aging (see also Appendix E). The shifts occurring between 1974 and 1999, and between 1974 and "stability," show the existence of a built-in momentum for further growth at the geographic-regions level (and, of course, nationwide). However, a more detailed, quantitative analysis seems in order to investigate possible regional differences in aging. For the purpose of this analysis the 18 age groups have been consolidated into three cohorts referred to as "pre-fertility age" (younger than 15 years), "fertility age" (15 through 49 years), and "post-fertility age" (50 years and older). In order to detect regional deviations, shifts on the regional level are compared to shifts on the national level (Table 11). Given a constant-growth regime, the share of the pre-fertility cohort tends to decline between 1974 and 1999 in the country as a whole, whereas the shares of people at and beyond fertility age will both rise, though the share of the fertility cohort shows only a slight increase. In the long run, the shares will change more drastically, with the share of the "fertile" cohort falling instead of rising (comparing the stable age composition with that of the base year). Medium- and long-term changes in the age composition of the East region are rather close to the national average. Major deviations from the national average show up for the South and the South-West for all cohorts between 1974 and 1999 (and for the North, except for the pre-fertility age cohort). The exceptional position of the South region also holds for the long term (from the present to stability). Thus, the lesson to be drawn from Table 11 is that the regional impact of the general process of aging is far from uniform.

TABLE 10 Medium- and long-term changes in population composition by region.

	Share of population (%)					Change (%)			
		Constant-fertility scenario		Low-fertility scenario		Constant-fertility scenario		Low-fertility scenario	
Geographic region	Base year 1974	1999	stability	1999	stability	1974–1999	1974–stability	1974–1999	1974–stability
North	10.9	12.1	15.2	11.8	12.2	1.2	4.3	0.9	1.3
East	19.2	21.4	24.0	21.0	21.9	2.2	4.8	1.8	2.7
West	45.6	39.9	33.4	40.0	35.7	−5.7	−12.2	−5.2	−9.9
South-West	2.4	2.6	2.8	2.6	2.7	0.2	0.4	0.2	0.3
South	21.9	24.0	24.6	24.2	27.5	2.1	2.7	2.3	5.6
Total	100.0	100.0	100.0	100.0	100.0	0	0	0	0
(in millions)	(13.5)	(15.1)	(19.3)	(14.6)	(19.7)				

(a) North

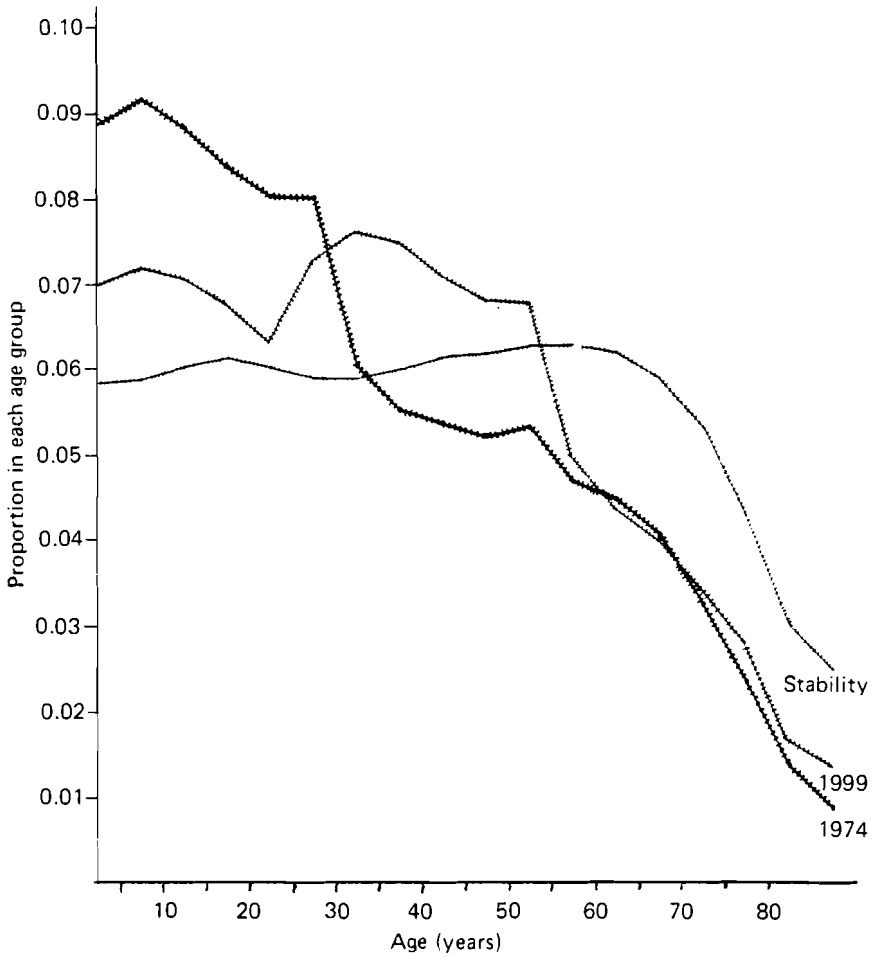


FIGURE 8 Medium- and long-term changes in population composition by age: five geographic regions.

(b) East

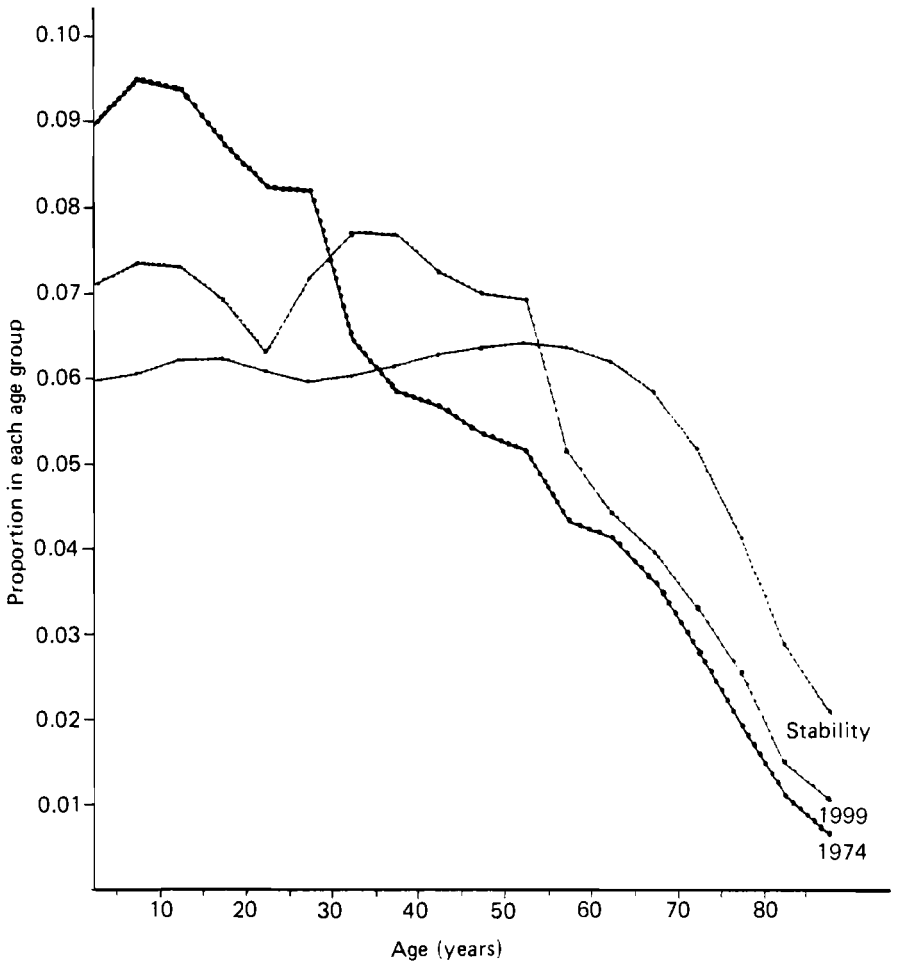


FIGURE 8 *Continued.*

(c) West

FIGURE 8 *Continued.*

(d) South-West

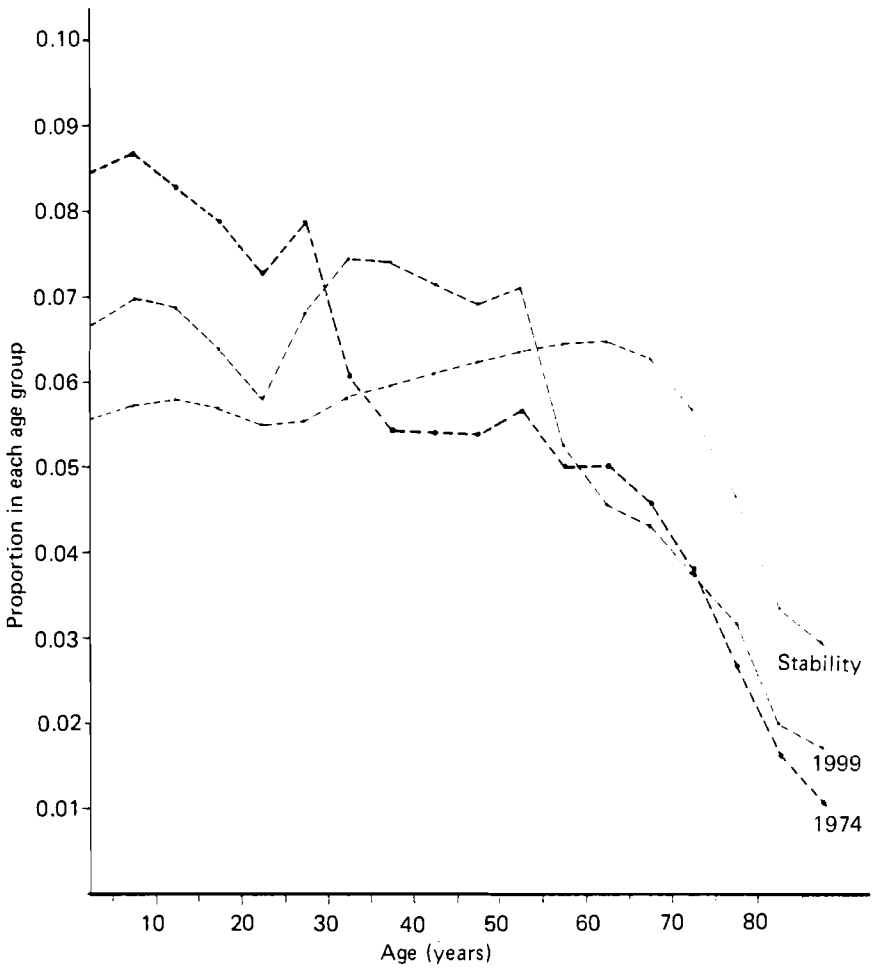


FIGURE 8 *Continued.*

(e) South

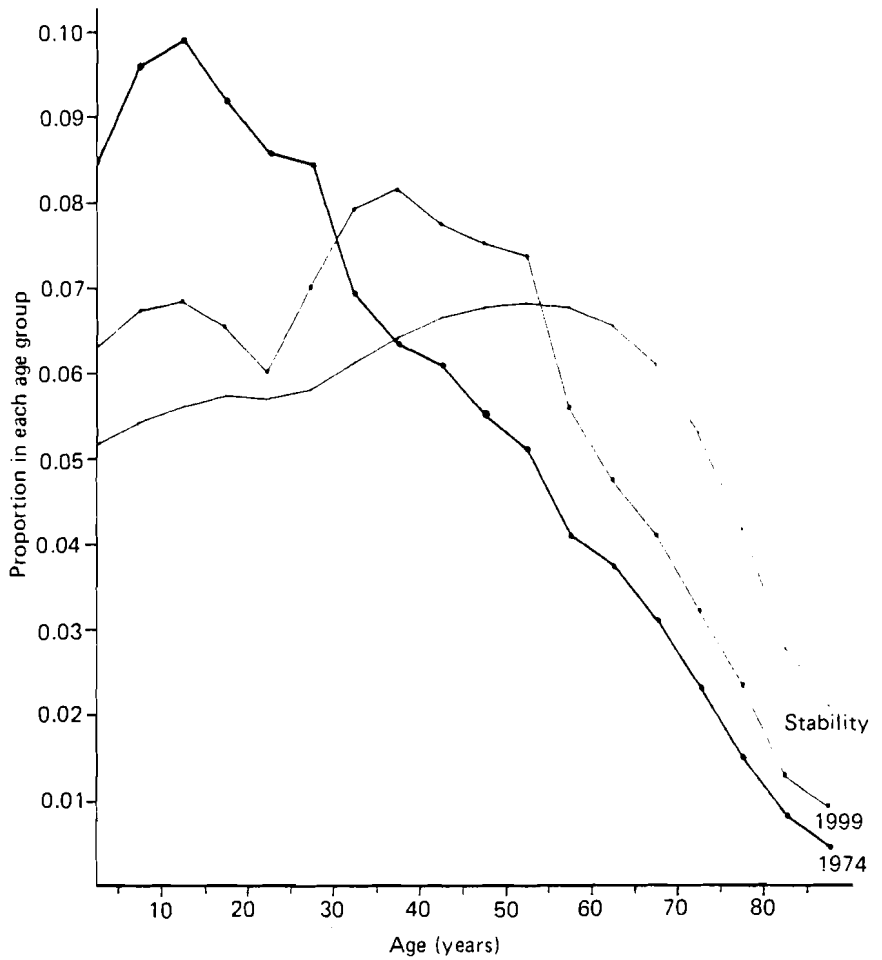


FIGURE 8 *Continued.*

TABLE 11 Medium- and long-term patterns of aging: three cohorts, five geographic regions (constant-fertility scenario).

	Geographic region					
	North	East	West	South-West	South	*Total*
"Pre-fertility age" (younger than 15 years)						
% shift 1974–1999[a]	−5.6	−6.2	−6.1	−4.9	−8.1	*−6.3*
	(89)	(98)	(97)	(78)	(129)	*(100)*
% shift 1974–stability[a]	−9.1	−9.6	−8.7	−8.3	−11.6	*−9.3*
	(98)	(103)	(94)	(89)	(125)	*(100)*
"Fertility age" (15 through 49 years)						
% shift 1974–1999[a]	2.7	1.2	1.7	2.5	−0.3	*1.2*
	(225)	(100)	(142)	(208)	(−25)	*(100)*
% shift 1974–stability[a]	−4.2	−5.5	−3.6	−4.4	−7.9	*−5.3*
	(79)	(104)	(68)	(83)	(149)	*(100)*
"Post-fertility age" (50 years and older)						
% shift 1974–1999[a]	2.9	5.0	4.4	2.4	8.4	*5.1*
	(57)	(98)	(86)	(47)	(165)	*(100)*
% shift 1974–stability[a]	13.2	15.1	12.3	12.8	19.5	*14.6*
	(90)	(103)	(84)	(88)	(134)	*(100)*

[a]Values within parentheses are comparisons with the national average.

To assume that the age curves of fertility observed in 1974 will remain unchanged is hardly realistic. A medium-term projection based on this assumption results in a total population close to the maximum alternative of the most recent national projection (15.2 million in the year 2000, assuming a recovery of fertility to a level of approximately 1.9 children per family). The "minimum" alternative, based on approximately 1.5 children per family, amounts to 14.3 million in the year 2000.

What happens to the composition by region and by age if fertility drops to the minimum level? To answer this question, we have simulated the medium- and long-term effects of a low-fertility scenario. Alternative age-specific regional fertility rates, based on the minimum alternative of the national projection, have been adapted from the most recent provincial projection of natural population growth (Rijksplanologische Dienst 1977). Thus, lower fertility rates are obtained for 1979–1984, 1984–1989, 1989–1994, and 1994–1999, replacing the age-specific regional fertility rates observed in 1974 in the previous projection.

The changes in regional shares, especially in the long term, are less drastic, except for the South region (see Table 10). This seems to be due to the built-in

TABLE 12 Medium- and long-term patterns of aging: the case of the South region (constant- versus low-fertility scenario).

	Constant-fertility scenario		Low-fertility scenario	
	South	Netherlands	South	Netherlands
"Pre-fertility age" (younger than 15 years)				
% shift 1974–1999[a]	−8.1	−6.3	−9.4	−8.2
	(129)	(100)	(115)	(100)
% shift 1974–stability[a]	−11.6	−9.3	−14.0	−12.6
	(125)	(100)	(111)	(100)
"Fertility age" (15 through 49 years)				
% shift 1974–1999[a]	−0.3	1.2	0.2	2.0
	(−25)	(100)	(10)	(100)
% shift 1974–stability[a]	−7.9	−5.3	−10.4	−8.0
	(149)	(100)	(130)	(100)
"Post-fertility age" (50 years and older)				
% shift 1974–1999[a]	8.4	5.1	9.2	6.2
	(165)	(100)	(148)	(100)
% shift 1974–stability[a]	19.5	14.6	24.3	20.6
	(134)	(100)	(118)	(100)

[a]Values within parentheses are comparisons with the national average.

assumption of the official provincial projection that provincial, and hence regional, differences in birth rates will tend to level out in the period 1979–1999 (cf. Drewe 1977a). Indeed, replacing the constant-fertility scenario by a low-fertility scenario leads not only to lower net reproduction rates, but also to rates that tend to become more uniform across all regions. As a consequence, both the North and the East gain less population, and the West loses less, whereas the South gains more in terms of regional shares.

This brings us to the composition of the population by age for which the exceptional position of the South region, with respect to the constant-fertility scenario, has already been noted. Since it would be too space-consuming to repeat the earlier analysis (shown in Table 11) for the low-fertility scenario, we prefer to concentrate on the "deviant" case of the South. Table 12 reveals that aging increases overall with a low-fertility scenario. But the gap between the South and the Netherlands as a whole starts to narrow, once the constant-fertility scenario is replaced by a low-fertility scenario. Due to the fact that the South region tends to become less of a deviant case under the new fertility regime, it gains more in the "zero-sum game" of regional shares.

TABLE 13 Shrinking exercises: the population of the West region in 1999, three levels of spatial aggregation.

Age	Population of the West region in 1999		
	Two regions[a]	*Five regions*	Twelve regions[b]
0	358,222	*358,715*	358,733
5	369,363	*369,802*	369,827
10	367,266	*367,685*	367,806
15	367,507	*367,989*	368,267
20	373,759	*374,435*	374,565
25	450,490	*451,324*	450,859
30	482,461	*482,939*	482,242
35	480,340	*480,595*	480,097
40	446,777	*447,055*	446,800
45	439,226	*439,306*	439,286
50	449,199	*449,351*	449,648
55	328,969	*328,869*	328,830
60	278,385	*278,253*	278,138
65	248,980	*248,874*	248,851
70	212,021	*211,949*	211,946
75	169,216	*169,154*	169,139
80	104,303	*104,260*	104,284
85	80,681	*80,652*	79,996
Total	6,007,164	*6,011,208*	6,009,313
Total percentage of the Dutch population	39.8325	*39.8573*	39.8185

[a]Data from Drewe and Rosenboom (1978).
[b]Unpublished data.

3.5 Shrinking Exercises

Our multiregional population analysis refers to geographic regions. This is just one way of aggregating spatial units. Since the same analysis has been carried out on a lower (provinces) and on a higher (the West and the Rest) level of aggregation, we are able to investigate the effect of alternative methods of shrinking by spatial aggregation (Rogers 1976). For a detailed description of the two-region case see Drewe and Rosenboom (1978).

Focusing on the West region of the Netherlands, population projections for the year 1999 (constant projections) are obtained based on systems of two, five, and twelve regions. The impact of aggregation is almost negligible, as shown in Table 13. Instead of starting from five geographic regions, we could choose either a more aggregated or a more disaggregated approach. If we opt for the

shortcut (the West and the rest of the country), then the difference in total population projected amounts to a little more than 4,000 persons, with a difference in total shares of about 0.02%. If, on the other hand, we switch from five to twelve regions, the differences amount to less than 2,000 (total population) and about 0.04% (total shares). In the latter case, the projection for the West region equals the sum of the provincial projections for Utrecht, and Noord- and Zuid-Holland (cf. Figure 1). Of course, the final evaluation of the alternatives depends on the particular purpose for which the projections are made, with due regard being given to the particular requirements of information or output quality.

Shrinking exercises may be extended to include population characteristics (age-specific versus total fertility, mortality, and migration) as well as time units (five-year rather than one-year intervals). Further information on shrinking exercises performed for the Netherlands are given in Drewe (1978b).

4 POPULATION DISTRIBUTION POLICY

The fact that quantitative targets are set for population distribution in the Netherlands calls for a quantitative approach to policy analysis. In this section, we will describe first the changes in targets over the last 11 years. Next, we will deal with the use of multiregional population analysis in relation to distribution policy, focusing on a simulation of the effects of alternative policy decisions related to internal migration. This leads to a discussion of policy effectiveness, which is one of the main issues in population distribution policy in the Netherlands.

4.1 Changes in Professed Policy Intentions

The tradition of setting quantitative targets for population distribution started with the Second Report on Physical Planning in the Netherlands (Tweede nota over de ruimtelijke ordening in Nederland 1966). It continued with Parts One and Two of the Third Report on Physical Planning (Oriënteringsnota ruimtelijke ordening 1974, Verstedelijkingsnota, deel 2a, 1976; deel 2d, 1977).

The 1977 targets of Dutch population distribution policy were radically different from those announced in 1966, though the changes were introduced gradually through three successive parts of the Third Report on Physical Planning. The quantitative side of these changes is summarized in Table 14, and the factual background has been described in Section 2.1. Background information on the dynamic interrelations between population redistribution policies and demographic developments is provided by Ter Heide and Eichperger (1978).

Over the last 11 years, the emphasis of population (re)distribution has shifted from massive intervention in favor of the North at the expense of the West, to positive intervention favoring the western provinces of Noord- and Zuid-Holland at the expense of the southern province of Noord-Brabant and the

TABLE 14 Regional population distribution in the Netherlands: facts, trends, and targets 1965–2000.

	Actual distribution (%)		Trend and *target* distribution (%)						
			Second Report		Third Report, Part One		Third Report, Part Two[a]		
Geographic region	1965 *1*	1973 *2*	2000 *3*	*2000* *4*	2000 *5*	*2000* *6*	2000 *7*	1990 *8*	*1990* *9*
North	10.7	10.9	11.3	*15.0*	11.0	*13.4*	10.9	11.0	*11.0*
East[b]	18.2	19.1	20.0	*23.7*	20.8	*20.0*	21.2	20.8	*20.2*
West	47.1	45.9	42.5		42.1	*40.9*	40.3	41.8	*43.0*
			+ = 66.2	*57.5*					
South	21.5	21.7	23.7		23.5	*23.1*	24.9	23.8	*23.2*
South-West	2.5	2.4	2.5	*3.8*	2.6	*2.6*	2.7	2.6	*2.6*
Total	100.0	100.0	100.0	*100.0*	(100.0)	*(100.0)*	100.0	100.0	*100.0*
(in millions)	(12.1)	(13.4)	(20.0)	*(20.0)*	(16.2)	*(16.2)*	(15.6[c])	(15.0[c])	*(15.0[c])*

[a] Most recent trend and target distribution; cf. Verstedelijkingsnota, deel 2a (1976) for preliminary trend and targets.
[b] Including the Southern Ysselmeerpolders.
[c] Including external migration.

SOURCES:
Columns *1, 3, 4*: Tweede nota (1966), p. 42.
Columns *2, 5, 6*: Oriënteringsnota (1974), p. 44.
Columns *7, 8, 9*: Verstedelijkingsnota, deel 2d (1977), pp. 14, 56.

eastern province of Gelderland. The most recent policy statements no longer consider the northern part of the Netherlands as a target area of distribution policy.

Back in 1966, the attention of policy makers was focused on the North. Being worried about the internal population losses suffered by the North in previous years and fearing a continuation of this trend, they opted for a substantial increase in the population share of the North until the year 2000 (see Table 14, columns *1*, *3*, and *4*). The western part of the country, a former winner in terms of internal migration, has turned into a loser from 1961 onward and it is projected that it will continue to be one. Back in 1966, this was considered a desirable course of development. Describing population distribution policy in terms of demographic indicators, however, does not imply a policy intended to solve "demographic problems," but rather one designed to serve two non-demographic purposes simultaneously: to relieve the western center from population pressure and to raise levels of welfare at the northern periphery. The North is a prototype rural, industrially less-developed region, similar to those found in all highly industrialized societies of the West-European type. As in all societies of this type, socioeconomic inequality on the geographic scale of regions has existed for a long time, manifesting itself, in the case of the Netherlands, as a "spatial inequality" between the less-developed North and the more-developed West region. Being concerned about "regional equity," the Dutch government decided to intervene. Opting for a substantial increase in the population share of the North seems to be based on the assumption of a simple, positive relation between population volume and regional welfare.

Once policy makers became aware of the fact that a share for the North of 15% in the year 2000 was much too ambitious a target, and once they admitted that the amount of effort necessary to redistribute population in favor of the North had been underrated (Third Report, Part One), the grounds were prepared for a reorientation of policy. But the objective of redistributing population toward the North had not yet been abandoned. A reduced share of 13.4% was proposed in Part One of the Third Report (Table 14, column *6*), but finally, even the reduced target was no longer supported. The trend share was eventually accepted in Part Two of the Third Report, at least as far as 1990 (Table 14, columns *8* and *9*). This was due to

- reservations with respect to the preliminary choice (a share for the North of 13.4%)
- doubts concerning the plausibility of the underlying assumption of a simple, positive relation between population volume and regional welfare
- reactions from the North region which were either indifferent to the preliminary choice or were divided

Furthermore, policy makers in 1976 were generally more concerned about the western part of the Netherlands than they were 10 years earlier. This new

concern was primarily reflected in policy options for urban planning (Drewe 1978a), but also affected population distribution policy. During the period 1965–1973, the population share of the West decreased by 1.2%. Internal-migration losses played an important part in this, particularly net out-migration from the western provinces of Noord- and Zuid-Holland into the provinces of Noord-Brabant (South) and Gelderland (East). The drawbacks of a continuation of this trend (a further reduction of the population share of the West, as shown in Table 14, columns *7* and *8*) would be threefold

- the housing situation in Noord- and Zuid-Holland would further deteriorate, especially in the cities
- the natural environment in Noord-Brabant and Gelderland would be seriously damaged
- interprovincial commuting would continue to increase, thus causing pressure for a costly expansion of the transportation infrastructure

In order to avoid these drawbacks, the government decided to discourage migration from the two western provinces to Noord-Brabant and Gelderland in the years 1980–1990. The proposed change of the regional population trend amounts to +70,000 people in Noord-Holland and +106,000 in Zuid-Holland, as against −91,000 in Noord-Brabant and −85,000 in Gelderland. This policy intention has been taken into account in the shares shown in Table 14, column *9*.

4.2 Distribution Policy and Multiregional Population Analysis

Multiregional population analysis can be applied to simulate the effects of policy intervention. The stated policy intentions of reducing migration from the West (Noord- and Zuid-Holland) to the South (Noord-Brabant) by 91,000 and to the East (Gelderland) by 85,000 in the years 1980–1990 provide the input for our simulation. They are translated into gross migraproduction rates (GMRs) that decrease over the period 1979–1989 as a linear function of time (approximating the period 1980–1990). Like the official intervention rates, the GMRs refer to total migration flows with the age-specific migration schedule being preserved.

The differences between the constant projection (as described in Section 3.4) and the simulated projection are worth noting. Net out-migration from the West to the South and to the East changes into net in-migration, due to policy interventions (see Table 15a). The North and the South-West gain a little more from the West and start to lose a little to the South and to the East. As a consequence, the share of the West region grows by 1.9%, whereas the share of the South is reduced by 1.0% and that of the East by 0.9%. This leaves the population shares of the North and of the South-West unchanged (see Table 15b).

Multiregional population analysis could also be applied at an earlier stage. It could serve as a basis for calculating the intervention rates necessary to achieve a desired population distribution by region, as against the composition by region

TABLE 15 Simulated effects of population redistribution.

	Constant projection	Simulated projection
(a) The impact on net migration		
(Net migration 1989, absolute numbers)		
West/South + East	−15,867	+16,866
West/North + South-West	−6,328	−7,382
South + East/North + South-West	−439	+398
(b) The impact on population composition by region		
(Population share 1989, %)		
North	11.7	11.7
East	20.7	19.8
West	41.8	43.7
South-West	2.5	2.5
South	23.3	22.3
Total	100.0	100.0

which would result from a constant projection. This requires the calculation procedure pertaining to the components-of-change model (cf. Drewe 1977b, for an application to the Netherlands) to be adapted to multiregional population analysis. Note that the calculation of intervention rates provides a starting point for testing the feasibility of policy interventions. An example of this, related to the 1966 target for the northern Netherlands, has been given by Drewe (1971).

The Dutch tradition of setting quantitative targets for population distribution policy is closely linked to the use of certain population models in the process of policy preparation, as described by Drewe (1977a). Distribution policy in the Netherlands is based on a combination of four approaches or models

- a population projection on the national level (basically a cohort-survival model for the country as a whole)
- estimates of foreign migration (nationwide)
- a provincial projection of natural population growth (to regionalize the national projection)
- a forecast of provincial net migration (linked to a regional labor-market model)

The relation between this hybrid approach and the systems approach of multiregional population analysis is worth investigating, because the latter may contribute to further improving the preparation and monitoring of Dutch population distribution policy.

4.3 Policy Effectiveness

We have learned from our simulation that the professed policy intentions of the Dutch government imply a radical change in migration between the West and the adjacent regions of the South and East: net out-migration from the West to the South and to the East must be changed into net in-migration within 10 years (as shown in Table 15a). This raises the issues of feasibility and policy effectiveness.

The ambitious targets of population distribution policy in the past, referring to the North and West regions, mainly concerned migration *beyond* commuting range, i.e., migration involving a "generalized cost" that inhibits daily commuting or, in other words, migrational movements (of members of the labor force) necessarily accompanied by job-site relocation. Population distribution policy with regard to this type of migration is associated with traditional regional policy and instruments such as investment subsidies, improvement of infrastructure, migration subsidies, relief work, and, more recently, with selective investment policy and decentralization of public services.

The recent policy intention to reduce migration from the West to the South and to the East concerns a different type of migration, i.e., migration *within* commuting range. Potentially, a large number of policy instruments are relevant to this new type of policy response. Population distribution policy, as a part of physical planning, involves eleven departments at the national level. As regards the instruments of policy, "generally effective instruments" and "special regional instruments" may be distinguished. Six special regional instruments were discussed in the Third Report, Part Two (each of them representing a package of policy instruments). They focus on

1. cities (urban renewal, existing urban areas in general)
2. growth centers and growth towns (including annexations, administrative (re)organization, employment, amenities, and so forth)
3. limits to suburban growth or sprawl (at the local, regional, and national levels)
4. regionalized employment policy (with regard to the five geographic regions used throughout this case study)
5. regionalized sociocultural policy (concentrating on growth centers, growth towns, and on older residential areas in cities)
6. greenbelts and other open spaces

Besides these special regional instruments, twelve generally effective instruments are listed, relating to: the *de jure* territorial organization, horizontal and vertical coordination, sector plans that are physically relevant, various types of physical plans, budget planning, housing policy, employment policy, transportation policy, social infrastructure planning, recreational policy, environmental hygiene regulations, and land policy.

Instead of just listing a large number of potentially relevant policy instruments *after* a particular course of action (intervention) has been chosen, some feasibility testing or assessment of policy effectiveness *prior to* the choice of action is called for. But even with respect to traditional regional-policy instruments, the record of the assessment of policy effectiveness is still poor (cf. Drewe 1979). Further research, along the lines indicated by the Nederlands Economisch Instituut (1977) and by Willekens (1978) and focusing on policy instruments and their effectiveness, is needed in order to improve Dutch population distribution policy. The Tinbergen policy framework may serve as a guideline for this kind of research (Fox *et al.* 1972; see also Bourne 1974, for the conceptual issues involved).

5 CONCLUSION

In concluding this case study, we would like to stress the relation between population distribution policy and multiregional population analysis. How does this analysis cope with the information needs of population distribution policy in the Netherlands? The use of multiregional population analysis as a projection (forecasting) tool is of primary importance here. It is the modeling of the joint impact of age-specific components of population change in an interconnected system of regions which makes this analysis attractive, compared to the existing population models that are used in policy preparation. From a policy viewpoint, long-term impacts based on the theoretical concept of stability are less important than medium-term impacts of demographic behavior. Also, the changes in demographic behavior are more relevant than the impacts of constant patterns. This is where simulation can be most useful, to gain insight into the effects of policy intervention and of changing demographic patterns, e.g., the effects of a low-fertility scenario. With a pragmatic outlook prevailing, the question of how to derive the matrix-growth operator from observed data in a straightforward fashion (Rogers 1975, Willekens 1977b, Willekens and Rogers 1978) deserves special attention. The same holds for the flexibility of multiregional population projections with regard to shrinking experiments (Rogers 1976). Shrinking spatial units provides a whole array of alternative models to choose from, taking into account trade-offs between information quality and various constraints.

Of course, further research is needed. Our discussion of policy effectiveness points to the need for "demometrics," i.e., the need to establish, empirically, quantitative relationships between demographic and socioeconomic variables, with special emphasis on policy instruments and their evaluation.

A general conclusion to be drawn from our case study is that the relation between the hybrid approach, which is actually used in policy preparation in the Netherlands, and the systems approach to multiregional population analysis is worth investigating. The latter may contribute to further improving the preparation and monitoring of Dutch population distribution policy. Of course, the proof of the pudding is in the eating. . .

Emphasizing the relation between multiregional population analysis and population distribution policy implies a choice. It implies that the contribution of multiregional population analysis to the understanding of spatial population dynamics is primarily judged from a viewpoint of application. However, this neither precludes nor substitutes for a demographer's or a regional scientist's evaluation of the theoretical contribution of the new methodology, compared with conventional analytical tools.

REFERENCES

Bourne, L.S. (1974) Conceptual issues in designing and evaluating strategies for national urban settlement systems. Pages 86–118, National Settlement Strategies, East and West, edited by H. Swain. Laxenburg, Austria: International Institute for Applied Systems Analysis.

Drewe, P. (1971) Steps toward action-oriented migration research. The Regional Science Association Papers 26: 145–164.

Drewe, P. (1977a) Migration in the Netherlands: policies and models. Delft Progress Report 2:343–369.

Drewe, P. (1977b) Interregionale Migratie en Spreidingsbeleid, Deelrapport 3: Berekening Implikaties Spreidingsbeleid (Interregional Migration and Distribution Policy, Report Part 3: Calculation of the Implications of Distribution Policy). Memorandum No. 17. Delft: Instituut voor Stedebouwkundig Onderzoek, Technische Hogeschool.

Drewe, P. (1978a) The effect of changing demographic patterns and structures on urban and regional planning. European Regional Planning Study Series, 12. Strasbourg: Council of Europe.

Drewe, P. (1978b) Interregionale Migratie en Spreidingsbeleid, Deelrapport 4: Vooruitberekening van de Regionale Bevolking: Enkele Alternatieven (Interregional Migration and Distribution Policy, Report Part 4: Forecasting of Regional Population: Some Alternatives). Memorandum No. 18. Delft: Instituut voor Stedebouwkundig Onderzoek, Technische Hogeschool.

Drewe, P. (1979) Integrated regional planning, as applied to the Northern Netherlands. Pages 219–245, Spatial Inequalities and Regional Development, edited by H. Folmer and J. Oosterhaven. Leiden: Martinus Nijhoff.

Drewe, P., and H. Rosenboom (1978) Interregionale Migratie en Spreidingsbeleid, Deelrapport 5: Opbouw en Werking van het "Multiregional Cohort-Survival Model" (Interregional Migration and Distribution Policy, Report Part 5: Structure and Operation of the "Multiregional Cohort-Survival Model"). Memorandum No. 19. Delft: Instituut voor Stedebouwkundig Onderzoek, Technische Hogeschool.

Drewe, P., and F. Willekens (1980) Maximum Likelihood Estimates of Directional, Age-Specific, Interprovincial Migration Flows in the Netherlands. Delft Progress Report Quarterly, forthcoming.

Fox, K., J. Sengupta, and E. Thorbecke (1972) The Theory of Quantitative Economic Policy. Amsterdam: North-Holland.

Nederlands Economisch Instituut (1977) De Samenhang tussen Woonmigratie, Werkplaatsverandering en Woon-Werk-Bereikbaarheid (The Connection between Residential Migration, Job-Site Relocation, and Home-to-Work Accessibility). Rotterdam.

Oriënteringsnota Ruimtelijke Ordening (1974) Derde Nota over de Ruimtelijke Ordening in Nederland, Deel 1 (Orientation Report on Physical Planning. Third Report on Physical Planning, Part 1). 's-Gravenhage: Staatsuitgeverij.

Rijksplanologische Dienst (1977) Provinciale Bevolkingsprognoses 1976 (National Physical Planning Agency. Provincial Population Forecasts, 1976). Publikatie '77-1. 's-Gravenhage: Staatsuitgeverij.

Rogers, A. (1975) Introduction to Multiregional Mathematical Demography. New York: John Wiley and Sons.

Rogers, A. (1976) Shrinking large-scale population-projection models by aggregation and decomposition. Environment and Planning A 8:515–541.

Ter Heide, H., and C.L. Eichperger (1978) Dynamic interrelations between population distribution policies and demographic developments. National Physical Planning Agency, Publication 78–3 (E). The Hague: Government Printing Office.

Tweede Nota over de Ruimtelijke Ordening in Nederland (1966) (Second Report on Physical Planning in the Netherlands). 's-Gravenhage: Staatsuitgeverij.

Verstedlijkingsnota (1976 en 1977) Derde Nota over de Ruimtelijke Ordening in Nederland, Deel 2a en Deel 2d (Report on Urban Development. Third Report on Physical Planning in the Netherlands, Parts 2a and 2d). 's-Gravenhage: Staatsuitgeverij.

Verster, A.C.P., and M. de Langen (1978) Residential mobility, work mobility and home-to-work accessibility. Netherlands Economic Institute Series: Foundations of Empirical Economic Research, 1. Rotterdam.

Willekens, F. (1977a) The Recovery of Detailed Migration Patterns from Aggregate Data: an Entropy-Maximizing Approach. RM-77-58. Laxenburg, Austria: International Institute for Applied Systems Analysis.

Willekens, F. (1977b) Sensitivity analysis in multiregional demographic models. Environment and Planning A 9:653–674.

Willekens, F. (1978) Optimal Control of Dynamic Population Systems. Paper prepared for presentation at the Quetelet Chair Seminar, April 27–28, 1978, The Catholic University of Louvaine, Belgium.

Willekens, F., A. Por, and R. Raquillet (1979) Entropy, Multiproportional, and Quadratic Techniques for Inferring Detailed Migration Patterns from Aggregate Data. Mathematical Theories, Algorithms, Applications, and Computer Programs. WP-79-88. Laxenburg, Austria: International Institute for Applied Systems Analysis.

Willekens, F., and A. Rogers (1978) Spatial Population Analysis: Methods and Computer Programs. RR-78-18. Laxenburg, Austria: International Institute for Applied Systems Analysis.

APPENDIXES

Appendix A

OBSERVED POPULATION AND NUMBERS OF BIRTHS, DEATHS, AND MIGRANTS: BY AGE AND GEOGRAPHIC REGION, TOTAL (BOTH SEXES), 1974

region north

age	population	births	deaths	migration from north	migration from east	north to west	north to s-west	north to south
0	130743.	0.	336.	0.	932.	801.	31.	206.
5	135201.	0.	50.	0.	734.	615.	23.	170.
10	130292.	0.	49.	0.	466.	377.	12.	108.
15	123493.	1214.	129.	0.	1053.	1255.	26.	179.
20	118443.	7358.	90.	0.	2130.	2406.	59.	406.
25	118078.	8693.	75.	0.	1534.	1641.	48.	351.
30	89192.	3002.	74.	0.	731.	736.	21.	176.
35	81644.	1005.	92.	0.	396.	387.	11.	95.
40	79333.	266.	181.	0.	275.	267.	8.	63.
45	76927.	17.	296.	0.	211.	197.	7.	45.
50	78815.	0.	471.	0.	174.	143.	6.	37.
55	69007.	0.	606.	0.	138.	95.	4.	27.
60	66111.	0.	951.	0.	155.	81.	5.	28.
65	60077.	0.	1365.	0.	150.	81.	4.	28.
70	47951.	0.	1803.	0.	125.	89.	3.	26.
75	34889.	0.	2121.	0.	113.	96.	4.	26.
80	20566.	0.	2012.	0.	73.	69.	3.	17.
85	12849.	0.	2394.	0.	53.	56.	3.	12.
total	1473611.	21555.	13095.	0.	9443.	9392.	278.	2000.

region east

age	population	births	deaths	migration from north	migration from east	east to west	east to s-west	east to south
0	231645.	0.	601.	880.	0.	1871.	89.	1115.
5	246260.	0.	108.	717.	0.	1422.	66.	919.
10	243706.	0.	79.	538.	0.	1009.	41.	665.
15	227172.	1799.	181.	1308.	0.	3432.	93.	1188.
20	213327.	11921.	164.	2159.	0.	6495.	205.	2689.
25	212823.	16790.	142.	1483.	0.	4161.	150.	2102.
30	166538.	5900.	139.	735.	0.	1864.	67.	1050.
35	151013.	2075.	199.	452.	0.	1106.	37.	637.
40	147391.	604.	318.	300.	0.	699.	27.	387.
45	139370.	33.	466.	220.	0.	513.	20.	281.
50	133470.	0.	792.	216.	0.	379.	20.	227.
55	112359.	0.	1020.	182.	0.	256.	15.	177.
60	106842.	0.	1595.	181.	0.	195.	16.	151.
65	93061.	0.	2276.	169.	0.	204.	13.	168.
70	72035.	0.	2760.	121.	0.	217.	8.	138.
75	50115.	0.	3238.	90.	0.	191.	8.	120.
80	28760.	0.	3051.	63.	0.	145.	7.	85.
85	16899.	0.	3371.	48.	0.	118.	7.	60.
total	2592786.	39122.	20500.	9862.	0.	24277.	889.	12159.

APPENDIX A *Continued.*

region west

age	population	births	deaths	migration from north	migration from east	west to west	west to s-west	west to south
0	475056.	0.	1110.	1462.	3557.	0.	558.	2646.
5	508423.	0.	178.	1251.	2886.	0.	447.	2324.
10	517580.	0.	121.	982.	2184.	0.	283.	1719.
15	496944.	3314.	306.	1403.	3105.	0.	370.	1798.
20	516029.	24918.	303.	2798.	6925.	0.	914.	4478.
25	543488.	35148.	338.	2370.	6087.	0.	869.	4568.
30	401903.	11919.	301.	1295.	3225.	0.	449.	2596.
35	355544.	3436.	437.	837.	1976.	0.	259.	1629.
40	349603.	818.	668.	586.	1305.	0.	194.	1031.
45	345466.	61.	1200.	477.	1044.	0.	152.	778.
50	344035.	0.	1789.	533.	948.	0.	169.	700.
55	303262.	0.	2670.	512.	857.	0.	149.	617.
60	286091.	0.	4085.	596.	970.	0.	182.	611.
65	248550.	0.	5912.	555.	907.	0.	148.	648.
70	195012.	0.	7395.	322.	558.	0.	69.	417.
75	137194.	0.	8469.	215.	401.	0.	67.	338.
80	80491.	0.	8241.	142.	276.	0.	45.	228.
85	45806.	0.	8932.	84.	164.	0.	35.	123.
total	6150477.	79614.	52455.	16420.	37375.	0.	5359.	27249.

region s-west

age	population	births	deaths	migration from north	migration from east	s-west to west	s-west to s-west	s-west to south
0	27282.	0.	68.	28.	84.	282.	0.	181.
5	28049.	0.	10.	25.	74.	237.	0.	168.
10	26742.	0.	11.	18.	52.	164.	0.	118.
15	25447.	246.	20.	46.	127.	555.	0.	215.
20	23450.	1593.	19.	64.	194.	879.	0.	378.
25	25405.	1832.	21.	39.	124.	524.	0.	275.
30	19584.	575.	11.	20.	65.	251.	0.	152.
35	17539.	212.	26.	15.	45.	165.	0.	102.
40	17415.	64.	27.	9.	25.	97.	0.	58.
45	17343.	4.	54.	8.	21.	80.	0.	46.
50	18234.	0.	107.	8.	17.	59.	0.	37.
55	16103.	0.	131.	6.	14.	41.	0.	29.
60	16217.	0.	199.	8.	15.	35.	0.	28.
65	14693.	0.	324.	8.	16.	37.	0.	32.
70	12137.	0.	398.	6.	15.	51.	0.	34.
75	8588.	0.	486.	3.	10.	36.	0.	23.
80	5231.	0.	468.	3.	8.	32.	0.	21.
85	3432.	0.	624.	3.	7.	26.	0.	15.
total	322891.	4526.	3004.	317.	913.	3551.	0.	1912.

APPENDIX A *Continued.*

region south

age	population	births	deaths	migration from north	migration from east	south to west	south to s-west	south to south
0	248418.	0.	626.	149.	875.	1201.	193.	0.
5	282294.	0.	102.	121.	690.	919.	148.	0.
10	291508.	0.	91.	103.	565.	720.	101.	0.
15	270524.	1995.	213.	303.	1655.	2821.	258.	0.
20	253093.	12261.	197.	475.	2845.	5006.	529.	0.
25	248805.	18224.	148.	270.	1695.	2831.	343.	0.
30	204253.	6198.	151.	130.	810.	1246.	154.	0.
35	186738.	1926.	231.	83.	501.	757.	89.	0.
40	179223.	483.	349.	59.	326.	501.	66.	0.
45	162372.	39.	592.	44.	234.	355.	48.	0.
50	149649.	0.	890.	43.	196.	268.	48.	0.
55	120900.	0.	1218.	33.	143.	165.	34.	0.
60	109899.	0.	1701.	34.	146.	131.	37.	0.
65	91524.	0.	2491.	31.	130.	126.	29.	0.
70	68095.	0.	2857.	23.	108.	142.	18.	0.
75	44155.	0.	3041.	16.	88.	125.	20.	0.
80	23975.	0.	2707.	10.	59.	85.	12.	0.
85	13175.	0.	2585.	8.	38.	56.	11.	0.
total	2948600.	41126.	20190.	1935.	11104.	17455.	2138.	0.

Appendix B

AGE-SPECIFIC MORTALITY, FERTILITY, AND MIGRATION RATES: BY GEOGRAPHIC REGION, 1974

APPENDIX B

death rates
****

age	north	east	west	s-west	south
0	0.002570	0.002594	0.002337	0.002492	0.002520
5	0.000370	0.000439	0.000350	0.000357	0.000361
10	0.000376	0.000324	0.000234	0.000411	0.000312
15	0.001045	0.000797	0.000616	0.000786	0.000787
20	0.000760	0.000769	0.000587	0.000810	0.000778
25	0.000635	0.000667	0.000622	0.000827	0.000595
30	0.000830	0.000835	0.000749	0.000562	0.000739
35	0.001127	0.001318	0.001229	0.001482	0.001237
40	0.002282	0.002158	0.001911	0.001550	0.001947
45	0.003848	0.003344	0.003474	0.003114	0.003646
50	0.005976	0.005934	0.005200	0.005868	0.005947
55	0.008782	0.009078	0.008804	0.008135	0.010074
60	0.014385	0.014929	0.014279	0.012271	0.015478
65	0.022721	0.024457	0.023786	0.022051	0.027217
70	0.037601	0.038315	0.037921	0.032792	0.041956
75	0.060793	0.064611	0.061730	0.056591	0.068871
80	0.097831	0.106085	0.102384	0.089467	0.112909
85	0.186318	0.199479	0.194996	0.181818	0.196205
gross	2.241239	2.380657	2.306039	2.106923	2.457907
crude	0.008886	0.007907	0.008529	0.009303	0.006847
m.age	79.1493	79.3888	79.5488	79.3597	79.2243

fertility rates
****

age	north	east	west	s-west	south
0	0.000000	0.000000	0.000000	0.000000	0.000000
5	0.000000	0.000000	0.000000	0.000000	0.000000
10	0.000000	0.000000	0.000000	0.000000	0.000000
15	0.009831	0.007919	0.006669	0.009667	0.007375
20	0.062123	0.055881	0.048288	0.067932	0.048445
25	0.073621	0.078892	0.064671	0.072112	0.073246
30	0.033658	0.035427	0.029656	0.029361	0.030345
35	0.012310	0.013741	0.009664	0.012087	0.010314
40	0.003353	0.004098	0.002340	0.003675	0.002695
45	0.000221	0.000237	0.000177	0.000231	0.000240
50	0.000000	0.000000	0.000000	0.000000	0.000000
55	0.000000	0.000000	0.000000	0.000000	0.000000
60	0.000000	0.000000	0.000000	0.000000	0.000000
65	0.000000	0.000000	0.000000	0.000000	0.000000
70	0.000000	0.000000	0.000000	0.000000	0.000000
75	0.000000	0.000000	0.000000	0.000000	0.000000
80	0.000000	0.000000	0.000000	0.000000	0.000000
85	0.000000	0.000000	0.000000	0.000000	0.000000
gross	0.975576	0.980975	0.807324	0.975322	0.863296
crude	0.014627	0.015089	0.012944	0.014017	0.013948
m.age	27.1780	27.6129	27.3478	26.9416	27.4080

outmigration rates
****

migration from north to

age	total	north	east	west	s-west	south
0	0.015068	0.000000	0.007128	0.006127	0.000237	0.001576
5	0.011405	0.000000	0.005429	0.004549	0.000170	0.001257
10	0.007391	0.000000	0.003577	0.002894	0.000092	0.000829
15	0.020349	0.000000	0.008527	0.010163	0.000211	0.001449
20	0.042223	0.000000	0.017983	0.020314	0.000498	0.003428
25	0.030268	0.000000	0.012991	0.013898	0.000407	0.002973
30	0.018656	0.000000	0.008196	0.008252	0.000235	0.001973
35	0.010889	0.000000	0.004850	0.004740	0.000135	0.001164
40	0.007727	0.000000	0.003466	0.003366	0.000101	0.000794
45	0.005980	0.000000	0.002743	0.002561	0.000091	0.000585
50	0.004568	0.000000	0.002208	0.001814	0.000076	0.000469
55	0.003826	0.000000	0.002000	0.001377	0.000058	0.000391
60	0.004069	0.000000	0.002345	0.001225	0.000076	0.000424
65	0.004378	0.000000	0.002497	0.001348	0.000067	0.000466
70	0.005068	0.000000	0.002607	0.001856	0.000063	0.000542
75	0.006850	0.000000	0.003239	0.002752	0.000115	0.000745
80	0.007877	0.000000	0.003550	0.003355	0.000146	0.000827
85	0.009651	0.000000	0.004125	0.004358	0.000233	0.000934
gross	1.081208	0.000000	0.487299	0.474732	0.015047	0.104130
crude	0.014327	0.000000	0.006408	0.006373	0.000189	0.001357
m.age	34.1440	0.0000	34.6803	33.2951	37.4959	35.0198

migration from east to

age	total	north	east	west	s-west	south
0	0.017074	0.003799	0.000000	0.008077	0.000384	0.004813
5	0.012686	0.002912	0.000000	0.005774	0.000268	0.003732
10	0.009245	0.002208	0.000000	0.004140	0.000168	0.002729
15	0.026504	0.005758	0.000000	0.015107	0.000409	0.005230
20	0.054133	0.010121	0.000000	0.030446	0.000961	0.012605
25	0.037101	0.006968	0.000000	0.019551	0.000705	0.009877
30	0.022313	0.004413	0.000000	0.011193	0.000402	0.006305
35	0.014780	0.002993	0.000000	0.007324	0.000245	0.004218
40	0.009587	0.002035	0.000000	0.004742	0.000183	0.002626
45	0.007419	0.001579	0.000000	0.003681	0.000144	0.002016
50	0.006309	0.001618	0.000000	0.002840	0.000150	0.001701
55	0.005607	0.001620	0.000000	0.002278	0.000134	0.001575
60	0.005082	0.001694	0.000000	0.001825	0.000150	0.001413
65	0.005953	0.001816	0.000000	0.002192	0.000140	0.001805
70	0.006719	0.001680	0.000000	0.003012	0.000111	0.001916
75	0.008161	0.001796	0.000000	0.003811	0.000160	0.002394
80	0.010431	0.002191	0.000000	0.005042	0.000243	0.002955
85	0.013788	0.002840	0.000000	0.006983	0.000414	0.003551
gross	1.364458	0.290200	0.000000	0.690100	0.026854	0.357305
crude	0.018199	0.003804	0.000000	0.009363	0.000343	0.004690
m.age	35.0119	36.0609	0.0000	34.0528	37.4599	35.8285

APPENDIX B *Continued.*

	migration from			west to		
age	total	north	east	west	s-west	south
0	0.017310	0.003078	0.007488	0.000000	0.001175	0.005570
5	0.013587	0.002461	0.005676	0.000000	0.000879	0.004571
10	0.009985	0.001897	0.004220	0.000000	0.000547	0.003321
15	0.013434	0.002823	0.006248	0.000000	0.000745	0.003618
20	0.029291	0.005422	0.013420	0.000000	0.001771	0.008678
25	0.025565	0.004361	0.011200	0.000000	0.001599	0.008405
30	0.018823	0.003222	0.008024	0.000000	0.001117	0.006459
35	0.013222	0.002354	0.005558	0.000000	0.000728	0.004582
40	0.008913	0.001676	0.003733	0.000000	0.000555	0.002949
45	0.007095	0.001381	0.003022	0.000000	0.000440	0.002252
50	0.006831	0.001549	0.002756	0.000000	0.000491	0.002035
55	0.007040	0.001688	0.002826	0.000000	0.000491	0.002035
60	0.008246	0.002083	0.003391	0.000000	0.000636	0.002136
65	0.009085	0.002233	0.003649	0.000000	0.000595	0.002607
70	0.007005	0.001651	0.002861	0.000000	0.000354	0.002138
75	0.007442	0.001567	0.002923	0.000000	0.000488	0.002464
80	0.008585	0.001764	0.003429	0.000000	0.000559	0.002833
85	0.008863	0.001834	0.003580	0.000000	0.000764	0.002685
gross	1.101600	0.215224	0.470015	0.000000	0.069677	0.346685
crude	0.014048	0.002670	0.006077	0.000000	0.000871	0.004430
m.age	36.9958	38.9715	36.1716	0.0000	38.1622	36.6522

	migration from			s-west to		
age	total	north	east	west	s-west	south
0	0.021076	0.001026	0.003079	0.010336	0.000000	0.006634
5	0.017969	0.000891	0.002638	0.008449	0.000000	0.005990
10	0.013163	0.000673	0.001945	0.006133	0.000000	0.004413
15	0.037057	0.001808	0.004991	0.021810	0.000000	0.008449
20	0.064606	0.002729	0.008273	0.037484	0.000000	0.016119
25	0.037867	0.001535	0.004881	0.020626	0.000000	0.010825
30	0.024918	0.001021	0.003319	0.012817	0.000000	0.007761
35	0.018644	0.000855	0.002566	0.009408	0.000000	0.005816
40	0.010853	0.000517	0.001436	0.005570	0.000000	0.003330
45	0.008937	0.000461	0.001211	0.004613	0.000000	0.002652
50	0.006636	0.000439	0.000932	0.003236	0.000000	0.002029
55	0.005589	0.000373	0.000869	0.002546	0.000000	0.001801
60	0.005303	0.000493	0.000925	0.002158	0.000000	0.001727
65	0.006330	0.000544	0.001089	0.002518	0.000000	0.002178
70	0.008734	0.000494	0.001236	0.004202	0.000000	0.002801
75	0.008384	0.000349	0.001164	0.004192	0.000000	0.002678
80	0.012235	0.000574	0.001529	0.006117	0.000000	0.004015
85	0.014860	0.000874	0.002040	0.007576	0.000000	0.004371
gross	1.615797	0.078289	0.220612	0.848954	0.000000	0.467943
crude	0.020728	0.000982	0.002828	0.010998	0.000000	0.005922
m.age	33.7642	35.8171	33.9247	32.9908	0.0000	34.7482

		migration from		south to		
age	total	north	east	west	s-west	south
0	0.009734	0.000600	0.003522	0.004835	0.000777	0.000000
5	0.006653	0.000429	0.002444	0.003255	0.000524	0.000000
10	0.005108	0.000353	0.001938	0.002470	0.000346	0.000000
15	0.018619	0.001120	0.006118	0.010428	0.000954	0.000000
20	0.034987	0.001877	0.011241	0.019779	0.002090	0.000000
25	0.020655	0.001085	0.006813	0.011378	0.001379	0.000000
30	0.011456	0.000636	0.003966	0.006100	0.000754	0.000000
35	0.007658	0.000444	0.002683	0.004054	0.000477	0.000000
40	0.005312	0.000329	0.001819	0.002795	0.000368	0.000000
45	0.004194	0.000271	0.001441	0.002186	0.000296	0.000000
50	0.003709	0.000287	0.001310	0.001791	0.000321	0.000000
55	0.003102	0.000273	0.001183	0.001365	0.000281	0.000000
60	0.003167	0.000309	0.001328	0.001192	0.000337	0.000000
65	0.003453	0.000339	0.001420	0.001377	0.000317	0.000000
70	0.004273	0.000338	0.001586	0.002085	0.000264	0.000000
75	0.005639	0.000362	0.001993	0.002831	0.000453	0.000000
80	0.006924	0.000417	0.002461	0.003545	0.000501	0.000000
85	0.008577	0.000607	0.002884	0.004250	0.000835	0.000000
gross	0.816093	0.050389	0.280751	0.428589	0.056364	0.000000
crude	0.011067	0.000656	0.003766	0.005920	0.000725	0.000000
m.age	35.3893	37.5193	35.8763	34.4812	37.9640	0.0000

Appendix C

TRANSITION PROBABILITIES OF DEATH AND MIGRATION: BY GEOGRAPHIC REGION, 1974

APPENDIX C

region north
****

age	death	migration from north	east	north to west	s-west	south
0	0.012752	0.916064	0.033136	0.028734	0.001197	0.008117
5	0.001851	0.943130	0.025878	0.021783	0.000861	0.006497
10	0.001871	0.962067	0.017301	0.014047	0.000466	0.004248
15	0.005128	0.899338	0.038727	0.048274	0.001048	0.007485
20	0.003755	0.808864	0.074716	0.091831	0.002522	0.018312
25	0.003173	0.858180	0.057044	0.063733	0.002095	0.015775
30	0.004129	0.907809	0.037792	0.038717	0.001211	0.010341
35	0.005637	0.941979	0.022983	0.022691	0.000682	0.006027
40	0.011319	0.951332	0.016594	0.016212	0.000510	0.004033
45	0.019026	0.952135	0.013138	0.012315	0.000451	0.002936
50	0.029422	0.948712	0.010502	0.008667	0.000376	0.002322
55	0.042978	0.938954	0.009401	0.006478	0.000284	0.001905
60	0.069444	0.911873	0.010725	0.005598	0.000360	0.002000
65	0.107580	0.873183	0.010924	0.005898	0.000304	0.002110
70	0.171893	0.807292	0.010644	0.007625	0.000266	0.002280
75	0.264025	0.710788	0.011796	0.010150	0.000439	0.002802
80	0.393380	0.582026	0.010956	0.010520	0.000480	0.002639
85	1.000000	0.000000	0.000000	0.000000	0.000000	0.000000

region east
****

age	death	migration from north	east	east to west	s-west	south
0	0.012859	0.017663	0.907440	0.037281	0.001885	0.022872
5	0.002178	0.013882	0.937137	0.027345	0.001327	0.018131
10	0.001616	0.010682	0.953638	0.019886	0.000835	0.013343
15	0.003960	0.026147	0.874126	0.069732	0.001936	0.024099
20	0.003779	0.042183	0.765541	0.129916	0.004428	0.054153
25	0.003312	0.030614	0.831306	0.086376	0.003427	0.044965
30	0.004145	0.020353	0.892256	0.051374	0.001988	0.029884
35	0.006549	0.014193	0.923387	0.034377	0.001209	0.020285
40	0.010711	0.009751	0.943300	0.022612	0.000907	0.012719
45	0.016601	0.007569	0.947812	0.017570	0.000706	0.009742
50	0.029213	0.007708	0.940764	0.013450	0.000729	0.008137
55	0.044387	0.007623	0.929306	0.010624	0.000641	0.007418
60	0.071938	0.007758	0.904845	0.008272	0.000702	0.006484
65	0.115239	0.007960	0.858846	0.009467	0.000626	0.007861
70	0.174864	0.006874	0.797765	0.012242	0.000468	0.007788
75	0.278060	0.006552	0.692314	0.013843	0.000606	0.008625
80	0.419109	0.006772	0.549032	0.015400	0.000780	0.008908
85	1.000000	0.000000	0.000000	0.000000	0.000000	0.000000

region west
****

age	death	migration from north	east	west to west	s-west	south
0	0.011659	0.014423	0.034541	0.907679	0.005378	0.026319
5	0.001756	0.011775	0.026877	0.933422	0.004113	0.022057
10	0.001180	0.009204	0.020265	0.950585	0.002603	0.016163
15	0.003110	0.013412	0.028834	0.934125	0.003360	0.017159
20	0.002991	0.024392	0.057197	0.868654	0.007432	0.039334
25	0.003112	0.019962	0.049413	0.881415	0.007078	0.039020
30	0.003745	0.015107	0.036813	0.908586	0.005109	0.030640
35	0.006132	0.011254	0.026088	0.931146	0.003392	0.021988
40	0.009526	0.008066	0.017798	0.947712	0.002643	0.014256
45	0.017223	0.006631	0.014426	0.948771	0.002095	0.010855
50	0.025726	0.007388	0.013055	0.941786	0.002326	0.009719
55	0.043108	0.007933	0.013181	0.923940	0.002297	0.009542
60	0.068973	0.009500	0.015376	0.893518	0.002900	0.009733
65	0.112336	0.009742	0.015771	0.848288	0.002584	0.011279
70	0.173254	0.006760	0.011636	0.798216	0.001450	0.008684
75	0.267559	0.005764	0.010625	0.705321	0.001805	0.008927
80	0.407755	0.005517	0.010479	0.565873	0.001760	0.008615
85	1.000000	0.000000	0.000000	0.000000	0.000000	0.000000

region s-west
****

age	death	migration from north	east	s-west to west	s-west	south
0	0.012374	0.005172	0.015051	0.047252	0.888919	0.031232
5	0.001783	0.004497	0.012985	0.039496	0.912518	0.028721
10	0.002034	0.003399	0.009615	0.029169	0.934418	0.021365
15	0.003887	0.008920	0.023503	0.098292	0.827414	0.037985
20	0.003945	0.013670	0.038113	0.156440	0.719887	0.067946
25	0.004036	0.007926	0.023667	0.090942	0.824130	0.049299
30	0.002863	0.005255	0.016304	0.058513	0.880466	0.036600
35	0.007331	0.004324	0.012556	0.043768	0.904304	0.027717
40	0.007777	0.002602	0.007097	0.026514	0.939903	0.016107
45	0.015492	0.002291	0.005945	0.021949	0.941543	0.012781
50	0.028894	0.002155	0.004531	0.015313	0.939402	0.009704
55	0.039937	0.001817	0.004168	0.011896	0.933677	0.008504
60	0.059679	0.002331	0.004337	0.009834	0.915851	0.007969
65	0.104689	0.002466	0.004863	0.010927	0.867521	0.009533
70	0.152075	0.002116	0.005196	0.017210	0.811920	0.011482
75	0.248411	0.001362	0.004384	0.015475	0.720553	0.009815
80	0.366872	0.001907	0.004922	0.019238	0.594611	0.012451
85	1.000000	0.000000	0.000000	0.000000	0.000000	0.000000

APPENDIX C *Continued.*

region south
****

age	death	migration from north	migration from east	south to west	south to s-west	south to south
0	0.012514	0.003118	0.016779	0.022821	0.003641	0.941128
5	0.001807	0.002230	0.011892	0.015702	0.002505	0.965863
10	0.001558	0.001820	0.009487	0.012016	0.001673	0.973446
15	0.003912	0.005807	0.028211	0.049459	0.004270	0.908341
20	0.003841	0.010051	0.048644	0.089315	0.008712	0.839437
25	0.002983	0.005847	0.031175	0.052678	0.006222	0.901095
30	0.003694	0.003375	0.018838	0.028907	0.003536	0.941650
35	0.006169	0.002321	0.012918	0.019447	0.002262	0.956883
40	0.009692	0.001679	0.008821	0.013507	0.001777	0.964524
45	0.018054	0.001361	0.006973	0.010533	0.001421	0.961657
50	0.029284	0.001425	0.006273	0.008550	0.001531	0.952936
55	0.049091	0.001330	0.005576	0.006398	0.001326	0.936280
60	0.074467	0.001466	0.006100	0.005430	0.001551	0.910986
65	0.127294	0.001532	0.006193	0.005952	0.001385	0.857643
70	0.189698	0.001425	0.006455	0.008463	0.001082	0.792876
75	0.293485	0.001370	0.007184	0.010255	0.001656	0.686050
80	0.439840	0.001341	0.007418	0.010779	0.001551	0.539070
85	1.000000	0.000000	0.000000	0.000000	0.000000	0.000000

Appendix D

EXPECTATIONS OF LIFE: BY GEOGRAPHIC REGION OF BIRTH AND GEOGRAPHIC REGION OF RESIDENCE, 1974

APPENDIX D

age initial region of cohort north
*** **********

	total	north	east	west	s-west	south
0	74.59782	44.76320	11.00532	13.01966	0.65325	5.15638
5	70.52906	40.48935	11.06356	13.11507	0.65866	5.20242
10	65.65572	36.04670	10.85893	12.94518	0.65161	5.15330
15	60.77077	31.79708	10.56151	12.69721	0.64113	5.07384
20	56.05754	27.90528	10.19411	12.35012	0.62919	4.97883
25	51.25544	24.50412	9.63904	11.69392	0.60814	4.81022
30	46.41085	21.62285	8.91225	10.75842	0.57476	4.54258
35	41.58771	19.05389	8.09903	9.70670	0.53248	4.19561
40	36.82239	16.66852	7.24882	8.62098	0.48599	3.79807
45	32.19056	14.43279	6.39791	7.54327	0.43805	3.37854
50	27.73536	12.33970	5.56120	6.49061	0.38966	2.95418
55	23.47527	10.37777	4.74766	5.47537	0.34130	2.53316
60	19.43761	8.54146	3.96623	4.51464	0.29322	2.12206
65	15.71687	6.86352	3.23284	3.64126	0.24627	1.73297
70	12.38892	5.37062	2.56124	2.87949	0.20171	1.37586
75	9.47893	4.07317	1.96009	2.22688	0.16178	1.05700
80	7.07053	3.01441	1.45061	1.68698	0.12883	0.78970
85	5.20579	2.20532	1.04505	1.26656	0.10354	0.58531

age initial region of cohort east
*** **********

	total	north	east	west	s-west	south
0	74.50987	6.52014	42.08635	15.67967	0.89200	9.33171
5	70.44792	6.56034	37.80388	15.78951	0.89884	9.39534
10	65.59412	6.45411	33.41935	15.57549	0.88800	9.25717
15	60.69498	6.29126	29.23530	15.25516	0.87151	9.04175
20	55.92504	6.07236	25.44049	14.78625	0.85147	8.77446
25	51.12217	5.74226	22.25060	13.93924	0.81869	8.37136
30	46.27958	5.31922	19.61743	12.76641	0.76946	7.80707
35	41.45385	4.85373	17.27257	11.48153	0.70953	7.13649
40	36.70074	4.36890	15.10110	10.17721	0.64530	6.40823
45	32.05467	3.87797	13.05716	8.88404	0.57941	5.65610
50	27.57380	3.39552	11.13155	7.62605	0.51333	4.90735
55	23.30307	2.92727	9.32820	6.42208	0.44814	4.17739
60	19.27450	2.47389	7.65043	5.29028	0.38405	3.47585
65	15.55763	2.04281	6.11409	4.26165	0.32169	2.81739
70	12.26243	1.64710	4.75525	3.37287	0.26338	2.22384
75	9.35201	1.28671	3.55763	2.60371	0.21064	1.69332
80	6.95892	0.98945	2.57171	1.97420	0.16769	1.25587
85	5.12420	0.76444	1.80620	1.49108	0.13539	0.92709

age	initial region of cohort	west				
***	**********					
	total	north	east	west	s-west	south
0	74.80988	5.24945	10.32534	48.52179	1.43323	9.28007
5	70.66292	5.27490	10.35978	44.26874	1.43653	9.32297
10	65.78403	5.18475	10.14490	39.89566	1.40325	9.15548
15	60.86314	5.04583	9.82638	35.73738	1.35603	8.89752
20	56.05618	4.87199	9.44300	31.84308	1.30347	8.59463
25	51.22645	4.63193	8.93561	28.22443	1.23807	8.19642
30	46.38003	4.32552	8.29604	24.93587	1.15476	7.66784
35	41.54770	3.97718	7.57106	21.90906	1.05858	7.03181
40	36.79093	3.60507	6.80410	19.09241	0.95789	6.33146
45	32.13232	3.22084	6.02141	16.43409	0.85584	5.60014
50	27.65598	2.84052	5.24920	13.93994	0.75505	4.87126
55	23.36290	2.46471	4.49280	11.59627	0.65579	4.15333
60	19.32928	2.09830	3.76841	9.43943	0.55940	3.46374
65	15.60160	1.74408	3.08078	7.49859	0.46591	2.81224
70	12.30173	1.41379	2.45115	5.83577	0.37888	2.22215
75	9.39239	1.10902	1.87785	4.41265	0.30033	1.69254
80	6.98605	0.85411	1.39275	3.25152	0.23561	1.25207
85	5.14133	0.66045	1.01122	2.36305	0.18627	0.92034

age	initial region of cohort	s-west				
***	**********					
	total	north	east	west	s-west	south
0	74.82590	3.29634	7.30628	18.14107	34.52808	11.55413
5	70.73207	3.32455	7.35972	18.24875	30.17921	11.61983
10	65.85438	3.29277	7.26520	17.95819	25.92141	11.41681
15	60.97648	3.24082	7.11732	17.53158	21.98235	11.10441
20	56.20120	3.16491	6.91162	16.89157	18.52938	10.70372
25	51.40331	3.03618	6.58509	15.81522	15.82592	10.14089
30	46.57722	2.85532	6.14212	14.42159	13.74257	9.41562
35	41.72986	2.63998	5.62519	12.93329	11.95183	8.57956
40	36.98957	2.40651	5.07410	11.44815	10.37078	7.69002
45	32.31133	2.15899	4.50027	9.96859	8.91634	6.76714
50	27.82347	1.91200	3.93174	8.54269	7.57917	5.85787
55	23.55408	1.66790	3.37666	7.18367	6.34993	4.97592
60	19.51455	1.42594	2.83885	5.90545	5.21556	4.12874
65	15.75612	1.18875	2.32395	4.73722	4.17598	3.33022
70	12.45385	0.96794	1.85572	3.73786	3.27323	2.61910
75	9.51063	0.76023	1.42341	2.86456	2.48336	1.97907
80	7.09518	0.58737	1.05935	2.15013	1.84528	1.45305
85	5.21530	0.45382	0.76876	1.59308	1.34660	1.05305

APPENDIX D *Continued.*

age	initial region of cohort					south
***	**********					
	total	north	east	west	s-west	south
0	74.33826	2.49719	7.48190	11.80985	1.30365	51.24568
5	70.24863	2.52094	7.53423	11.90173	1.31096	46.98077
10	65.37162	2.50352	7.43521	11.77225	1.28939	42.37125
15	60.46925	2.47384	7.28529	11.57863	1.25873	37.87275
20	55.69535	2.42913	7.07370	11.27268	1.22047	33.69938
25	50.89601	2.34194	6.71984	10.66866	1.16115	30.00442
30	46.04435	2.20872	6.23533	9.80069	1.07915	26.72046
35	41.20832	2.04742	5.68827	8.84004	0.98605	23.64653
40	36.45023	1.86953	5.11339	7.85958	0.89031	20.71742
45	31.78658	1.68168	4.52696	6.87860	0.79401	17.90533
50	27.31360	1.49354	3.94969	5.92469	0.69954	15.24615
55	23.04174	1.30622	3.38648	5.00565	0.60722	12.73617
60	19.04730	1.12259	2.84981	4.14586	0.51843	10.41061
65	15.33753	0.94229	2.33875	3.35738	0.43246	8.26665
70	12.10081	0.77573	1.87984	2.68634	0.35457	6.40432
75	9.23691	0.61951	1.45972	2.10108	0.28432	4.77228
80	6.88956	0.48938	1.10526	1.61990	0.22708	3.44794
85	5.12393	0.39270	0.82723	1.25258	0.18437	2.46705

Appendix E

MULTIREGIONAL POPULATION PROJECTION (CONSTANT AND AGE-SPECIFIC RATES OF FERTILITY, MORTALITY, AND MIGRATION): 1974, 1999, AND STABLE EQUIVALENT POPULATION

year 1974

population

age	total	north	east	west	s-west	south
0	1113144.	130743.	231645.	475056.	27282.	248418.
5	1200227.	135201.	246260.	508423.	28049.	282294.
10	1209828.	130292.	243706.	517580.	26742.	291508.
15	1143580.	123493.	227172.	496944.	25447.	270524.
20	1124342.	118443.	213327.	516029.	23450.	253093.
25	1148599.	118078.	212823.	543488.	25405.	248805.
30	881470.	89192.	166538.	401903.	19584.	204253.
35	792478.	81644.	151013.	355544.	17539.	186738.
40	772965.	79333.	147391.	349603.	17415.	179223.
45	741478.	76927.	139370.	345466.	17343.	162372.
50	724203.	78815.	133470.	344035.	18234.	149649.
55	621631.	69007.	112359.	303262.	16103.	120900.
60	585160.	66111.	106842.	286091.	16217.	109899.
65	507905.	60077.	93061.	248550.	14693.	91524.
70	395230.	47951.	72035.	195012.	12137.	68095.
75	274941.	34889.	50115.	137194.	8588.	44155.
80	159023.	20566.	28760.	80491.	5231.	23975.
85	92161.	12849.	16899.	45806.	3432.	13175.
total	13488365.	1473611.	2592786.	6150477.	322891.	2948600.

percentage distribution

age	total	north	east	west	s-west	south
0	8.2526	8.8723	8.9342	7.7239	8.4493	8.4249
5	8.8982	9.1748	9.4979	8.2664	8.6868	9.5738
10	8.9694	8.8417	9.3994	8.4153	8.2821	9.8863
15	8.4783	8.3803	8.7617	8.0798	7.8810	9.1747
20	8.3356	8.0376	8.2277	8.3901	7.2625	8.5835
25	8.5155	8.0128	8.2083	8.8365	7.8680	8.4381
30	6.5350	6.0526	6.4231	6.5345	6.0652	6.9271
35	5.8753	5.5404	5.8244	5.7808	5.4319	6.3331
40	5.7306	5.3836	5.6847	5.6842	5.3935	6.0782
45	5.4972	5.2203	5.3753	5.6169	5.3712	5.5067
50	5.3691	5.3484	5.1477	5.5936	5.6471	5.0753
55	4.6086	4.6829	4.3335	4.9307	4.9871	4.1003
60	4.3383	4.4863	4.1207	4.6515	5.0224	3.7272
65	3.7655	4.0769	3.5892	4.0412	4.5505	3.1040
70	2.9302	3.2540	2.7783	3.1707	3.7589	2.3094
75	2.0384	2.3676	1.9329	2.2306	2.6597	1.4975
80	1.1790	1.3956	1.1092	1.3087	1.6201	0.8131
85	0.6833	0.8719	0.6518	0.7448	1.0629	0.4468
total	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000
m.ag	33.0661	33.4708	32.1835	34.1376	35.0225	31.1904
sha	100.0000	10.9251	19.2224	45.5984	2.3938	21.8603

APPENDIX E *Continued.*

year 1999

population

age	total	north	east	west	s-west	south
0	966968.	128060.	228126.	358715.	26137.	225930.
5	1006513.	131346.	236058.	369802.	27309.	241998.
10	1004954.	129605.	234208.	367685.	26963.	246493.
15	974594.	124050.	222001.	367989.	25065.	235488.
20	932271.	115490.	203135.	374436.	22750.	216461.
25	1092919.	132920.	230116.	451324.	26733.	251825.
30	1182723.	139217.	246602.	482939.	29159.	284806.
35	1188230.	137140.	247005.	480595.	29065.	294425.
40	1116985.	129687.	232584.	447055.	27899.	279760.
45	1087062.	124795.	224397.	439306.	27130.	271435.
50	1089047.	123817.	222289.	449351.	27878.	265713.
55	808376.	91554.	165266.	328869.	20577.	202109.
60	688491.	80016.	141532.	278253.	17930.	170761.
65	614522.	72911.	127590.	248874.	16816.	148330.
70	511696.	62814.	106031.	211949.	14686.	116216.
75	398793.	51294.	81420.	169154.	12308.	84616.
80	237233.	31296.	47353.	104260.	7752.	46572.
85	180450.	25324.	34815.	79834.	6772.	33705.
total	15081828.	1831337.	3230529.	6010390.	392927.	3616645.

percentage distribution

age	total	north	east	west	s-west	south
0	6.4115	6.9927	7.0616	5.9682	6.6519	6.2470
5	6.6737	7.1721	7.3071	6.1527	6.9502	6.6912
10	6.6633	7.0771	7.2498	6.1175	6.8620	6.8155
15	6.4620	6.7738	6.8720	6.1226	6.3791	6.5112
20	6.1814	6.3063	6.2880	6.2298	5.7898	5.9851
25	7.2466	7.2581	7.1232	7.5091	6.8035	6.9630
30	7.8420	7.6020	7.6335	8.0351	7.4210	7.8749
35	7.8786	7.4885	7.6460	7.9961	7.3970	8.1408
40	7.4062	7.0815	7.1996	7.4380	7.1003	7.7354
45	7.2078	6.8144	6.9461	7.3091	6.9045	7.5051
50	7.2209	6.7610	6.8809	7.4762	7.0949	7.3470
55	5.3599	4.9993	5.1158	5.4717	5.2369	5.5883
60	4.5650	4.3692	4.3811	4.6295	4.5631	4.7215
65	4.0746	3.9813	3.9495	4.1407	4.2797	4.1013
70	3.3928	3.4300	3.2822	3.5264	3.7375	3.2134
75	2.6442	2.8009	2.5203	2.8144	3.1324	2.3396
80	1.5730	1.7089	1.4658	1.7347	1.9728	1.2877
85	1.1965	1.3828	1.0777	1.3283	1.7234	0.9319
total	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000
m.ag	37.4127	36.8425	36.3576	38.2472	38.0679	37.1860
sha	100.0000	12.1427	21.4200	39.8519	2.6053	23.9801
lam	1.013957	1.032485	1.030530	0.991120	1.026793	1.027815
r	0.002772	0.006394	0.006015	-0.001784	0.005288	0.005487

APPENDIX E *Continued.*

stable equivalent to original population
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age	total	north	east	west	s-west	south
0	1061177.	171621.	276373.	336448.	29884.	246851.
5	1080886.	173475.	281351.	337513.	30672.	257876.
10	1107010.	177370.	288074.	340903.	31204.	269458.
15	1132642.	180001.	289531.	359071.	30625.	273414.
20	1157696.	177513.	281980.	397353.	29460.	271389.
25	1183727.	173804.	276460.	426156.	29894.	277412.
30	1210148.	173787.	279352.	433938.	31265.	291806.
35	1235275.	176710.	284821.	436098.	32015.	305632.
40	1257005.	180189.	289868.	438438.	32684.	315826.
45	1271844.	182396.	293969.	439842.	33458.	322179.
50	1275152.	183850.	295582.	437014.	34060.	324645.
55	1260691.	184316.	293452.	426374.	34509.	322040.
60	1218928.	181677.	286375.	404045.	34612.	312218.
65	1134757.	173308.	269890.	367324.	33544.	290691.
70	995855.	155405.	239011.	317714.	30290.	253435.
75	795403.	125836.	191245.	254038.	24991.	199293.
80	543451.	87816.	129882.	175236.	18067.	132449.
85	423660.	72455.	96837.	138827.	15853.	99688.
total	19345306.	2931529.	4644054.	6466333.	537086.	4766304.

percentage distribution

age	total	north	east	west	s-west	south
0	5.4855	5.8543	5.9511	5.2031	5.5642	5.1791
5	5.5873	5.9176	6.0583	5.2195	5.7107	5.4104
10	5.7224	6.0504	6.2031	5.2720	5.8099	5.6534
15	5.8549	6.1402	6.2345	5.5529	5.7020	5.7364
20	5.9844	6.0553	6.0719	6.1450	5.4851	5.6939
25	6.1189	5.9288	5.9530	6.5904	5.5660	5.8203
30	6.2555	5.9282	6.0153	6.7107	5.8213	6.1223
35	6.3854	6.0279	6.1330	6.7441	5.9609	6.4124
40	6.4977	6.1466	6.2417	6.7803	6.0855	6.6262
45	6.5744	6.2219	6.3300	6.8020	6.2295	6.7595
50	6.5915	6.2715	6.3647	6.7583	6.3417	6.8113
55	6.5168	6.2874	6.3189	6.5938	6.4252	6.7566
60	6.3009	6.1973	6.1665	6.2484	6.4444	6.5505
65	5.8658	5.9119	5.8115	5.6806	6.2455	6.0989
70	5.1478	5.3011	5.1466	4.9134	5.6396	5.3172
75	4.1116	4.2925	4.1181	3.9286	4.6530	4.1813
80	2.8092	2.9956	2.7967	2.7100	3.3639	2.7789
85	2.1900	2.4716	2.0852	2.1469	2.9516	2.0915
total	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000
m.ag	41.8949	41.7443	41.1934	41.9702	43.0489	42.4387
sha	100.0000	15.1537	24.0061	33.4258	2.7763	24.6380
lam	0.974735	0.974735	0.974734	0.974735	0.974735	0.974734
r	-0.005118	-0.005118	-0.005118	-0.005118	-0.005118	-0.005118

Appendix F

OBSERVED POPULATION AND NUMBER OF BIRTHS, DEATHS, AND MIGRANTS: BY AGE AND PROVINCE, TOTAL (BOTH SEXES), 1974

APPENDIX F

region groning

age	population	births	deaths	migration from groning to groning	friesl.	drenthe	overijsgelderl.	utrecht	n.holl	z.holl	zeeland	n.brab	limburg	ijs.+dr.
0	44233.	0.	123.	1858.	248.	522.	155.	140.	67.	122.	126.	16.	72.	22.	17.
5	44890.	0.	11.	1382.	201.	428.	116.	107.	51.	92.	90.	11.	57.	18.	13.
10	43409.	0.	11.	890.	130.	285.	72.	68.	33.	53.	54.	6.	35.	11.	7.
15	43048.	419.	41.	2201.	199.	381.	117.	125.	76.	151.	122.	10.	46.	14.	7.
20	47621.	2481.	23.	4245.	487.	884.	321.	290.	159.	353.	328.	27.	126.	40.	18.
25	45135.	3042.	25.	3191.	429.	838.	282.	254.	133.	283.	280.	26.	129.	42.	23.
30	31906.	991.	24.	1406.	191.	424.	121.	118.	60.	118.	116.	11.	62.	19.	11.
35	28885.	326.	34.	740.	106.	230.	65.	61.	33.	61.	56.	5.	32.	11.	5.
40	28424.	78.	76.	531.	78.	162.	44.	40.	22.	40.	39.	4.	21.	7.	4.
45	28052.	4.	110.	417.	59.	133.	36.	30.	17.	29.	30.	3.	15.	5.	3.
50	29498.	0.	184.	392.	70.	132.	32.	26.	13.	22.	24.	3.	13.	4.	2.
55	26065.	0.	224.	281.	60.	112.	26.	20.	9.	15.	16.	2.	10.	3.	2.
60	25300.	0.	371.	306.	72.	134.	32.	23.	9.	12.	14.	3.	10.	4.	2.
65	22818.	0.	510.	278.	61.	124.	31.	20.	9.	11.	13.	2.	10.	3.	2.
70	17955.	0.	661.	225.	43.	92.	24.	17.	10.	11.	15.	1.	9.	3.	1.
75	12998.	0.	773.	222.	38.	77.	22.	17.	10.	13.	16.	2.	9.	3.	0.
80	7655.	0.	728.	132.	22.	46.	13.	11.	6.	10.	10.	1.	6.	2.	0.
85	4757.	0.	824.	137.	19.	35.	9.	10.	5.	9.	8.	1.	4.	1.	0.
total	532649.	7341.	4753.	18834.	2513.	5039.	1518.	1377.	722.	1405.	1357.	134.	666.	212.	117.

region friesl.

age	population	births	deaths	migration from friesl. to groning	friesl.	drenthe	overijsgelderl.	utrecht	n.holl	z.holl	zeeland	n.brab	limburg	ijs.+dr.
0	51389.	0.	127.	211.	1715.	124.	126.	127.	55.	139.	89.	7.	44.	14.	32.
5	53029.	0.	27.	166.	1474.	108.	100.	102.	44.	111.	67.	6.	37.	12.	26.
10	50398.	0.	26.	115.	1018.	77.	67.	70.	30.	69.	43.	3.	25.	8.	16.
15	46402.	430.	41.	416.	2288.	151.	158.	188.	103.	287.	143.	8.	47.	15.	21.
20	40913.	2946.	37.	559.	3905.	244.	302.	303.	150.	467.	268.	15.	90.	30.	41.
25	42209.	3266.	34.	315.	2581.	173.	200.	200.	94.	281.	172.	11.	69.	24.	38.
30	32521.	1208.	30.	152.	1257.	96.	94.	101.	46.	128.	78.	5.	36.	12.	19.
35	29509.	430.	30.	84.	738.	55.	53.	55.	27.	69.	40.	3.	20.	7.	10.
40	28183.	118.	64.	61.	540.	39.	36.	36.	18.	46.	28.	2.	13.	4.	8.
45	27208.	9.	91.	50.	427.	33.	30.	29.	15.	34.	22.	2.	10.	3.	6.
50	27551.	0.	168.	38.	410.	27.	22.	20.	9.	21.	14.	1.	7.	2.	3.
55	24766.	0.	214.	29.	371.	24.	19.	16.	6.	15.	10.	1.	5.	2.	3.
60	24596.	0.	338.	30.	428.	27.	22.	18.	6.	12.	9.	1.	5.	2.	3.
65	22855.	0.	533.	32.	426.	30.	25.	19.	7.	13.	10.	1.	6.	2.	3.
70	18601.	0.	711.	25.	286.	21.	19.	14.	8.	12.	10.	1.	5.	2.	2.
75	13689.	0.	844.	23.	242.	17.	16.	14.	7.	14.	10.	1.	5.	2.	1.
80	8158.	0.	807.	18.	184.	13.	12.	11.	6.	13.	8.	1.	4.	1.	0.
85	5246.	0.	1028.	17.	138.	9.	8.	9.	5.	11.	6.	1.	3.	1.	0.
total	547223.	8407.	5150.	2341.	18428.	1268.	1309.	1332.	636.	1742.	1027.	70.	431.	143.	232.

region drenthe

age	population	births	deaths	migration from drenthe to groning	friesl.	drenthe	overijs	gelderl.	utrecht	n.holl	z.holl	zeeland	n.brab	limburg	ijs.+dr.
0	35121.	0.	86.	342.	109.	730.	199.	122.	48.	79.	76.	8.	40.	14.	14.
5	37282.	0.	12.	271.	94.	638.	159.	99.	39.	63.	58.	6.	34.	12.	12.
10	36485.	0.	12.	172.	60.	418.	98.	62.	25.	36.	34.	3.	21.	8.	6.
15	34043.	365.	47.	668.	144.	880.	249.	179.	90.	162.	121.	8.	42.	15.	9.
20	29909.	1931.	30.	982.	269.	1555.	520.	315.	144.	288.	249.	17.	88.	32.	20.
25	30734.	2385.	16.	521.	167.	1040.	324.	196.	85.	163.	150.	11.	63.	24.	17.
30	24765.	803.	20.	259.	84.	593.	156.	102.	43.	77.	70.	5.	35.	12.	9.
35	23250.	249.	28.	142.	49.	335.	87.	55.	25.	41.	35.	3.	18.	7.	5.
40	22726.	70.	41.	111.	39.	258.	64.	39.	18.	29.	27.	2.	13.	5.	4.
45	21667.	4.	95.	78.	26.	188.	47.	27.	13.	19.	18.	2.	9.	3.	3.
50	21766.	0.	119.	75.	32.	192.	43.	24.	10.	15.	15.	2.	8.	3.	2.
55	18176.	0.	168.	51.	26.	155.	33.	17.	6.	9.	9.	1.	5.	2.	2.
60	16215.	0.	242.	49.	28.	163.	36.	17.	5.	7.	7.	1.	5.	2.	2.
65	14404.	0.	322.	44.	23.	149.	34.	15.	5.	6.	7.	1.	5.	2.	1.
70	11395.	0.	431.	42.	19.	132.	32.	15.	7.	7.	9.	1.	5.	2.	1.
75	8202.	0.	504.	41.	17.	109.	28.	15.	7.	9.	10.	1.	5.	2.	0.
80	4753.	0.	477.	25.	10.	65.	17.	9.	4.	6.	6.	1.	3.	1.	0.
85	2846.	0.	542.	20.	7.	39.	10.	7.	3.	5.	4.	1.	2.	1.	0.
total	393739.	5807.	3192.	3893.	1203.	7639.	2136.	1315.	577.	1021.	905.	74.	401.	147.	107.

region overijs

age	population	births	deaths	migration from overijs to groning	friesl.	drenthe	overijs	gelderl.	utrecht	n.holl	z.holl	zeeland	n.brab	limburg	ijs.+dr.
0	88353.	0.	262.	146.	141.	238.	1993.	629.	138.	181.	188.	26.	142.	50.	65.
5	93750.	0.	39.	111.	117.	199.	1521.	490.	108.	139.	137.	19.	116.	42.	50.
10	92184.	0.	32.	80.	84.	149.	1070.	348.	77.	91.	93.	11.	81.	29.	32.
15	84267.	714.	70.	292.	190.	293.	2532.	944.	263.	377.	307.	27.	152.	55.	43.
20	76757.	4557.	67.	397.	329.	478.	4902.	1540.	390.	620.	582.	53.	298.	107.	84.
25	76962.	6450.	59.	252.	244.	383.	3649.	1143.	276.	420.	420.	42.	256.	96.	87.
30	60812.	2308.	54.	118.	115.	205.	1657.	559.	131.	186.	184.	19.	132.	46.	44.
35	55640.	862.	84.	69.	71.	123.	982.	321.	80.	106.	99.	10.	75.	29.	24.
40	54915.	237.	125.	45.	47.	80.	604.	193.	48.	64.	63.	7.	45.	16.	17.
45	52170.	17.	183.	31.	32.	58.	439.	130.	34.	40.	43.	5.	29.	11.	11.
50	50526.	0.	310.	29.	37.	56.	387.	110.	25.	31.	33.	5.	24.	9.	8.
55	42319.	0.	403.	21.	32.	48.	319.	85.	17.	20.	22.	4.	18.	7.	7.
60	40712.	0.	611.	20.	34.	50.	338.	85.	14.	15.	17.	4.	16.	7.	6.
65	35326.	0.	911.	18.	29.	46.	326.	75.	15.	13.	17.	3.	17.	6.	5.
70	27243.	0.	1049.	14.	19.	33.	243.	59.	16.	13.	18.	2.	14.	5.	3.
75	18753.	0.	1182.	12.	14.	24.	187.	51.	14.	13.	16.	2.	12.	4.	1.
80	10236.	0.	1108.	8.	10.	17.	132.	39.	10.	11.	12.	2.	9.	3.	0.
85	5881.	0.	1138.	8.	7.	11.	84.	30.	8.	9.	9.	2.	6.	2.	0.
total	966806.	15145.	7687.	1671.	1552.	2491.	21365.	6831.	1664.	2349.	2260.	243.	1442.	524.	487.

APPENDIX F *Continued.*

region gelderl.

age	population	births	deaths	migration from gelderl. to groning	friesl.	drenthe	overijsgelderl.	utrecht	n.holl	z.holl	zeeland	n.brab	limburgijs.+dr.
0	139744.	0.	327.	121.	99.	110.	541.	3719.	483.	365.	482.	61.	673.	244.	75.
5	149118.	0.	68.	92.	82.	91.	412.	2886.	376.	279.	350.	45.	547.	208.	58.
10	148852.	0.	45.	69.	62.	71.	303.	2145.	282.	191.	248.	28.	398.	151.	38.
15	140990.	1066.	110.	238.	131.	133.	677.	5494.	905.	749.	775.	64.	709.	266.	48.
20	134497.	7147.	93.	385.	271.	258.	1562.	10684.	1602.	1470.	1752.	149.	1655.	620.	113.
25	132957.	10059.	82.	216.	178.	182.	1026.	6997.	998.	878.	1115.	105.	1255.	487.	104.
30	103600.	3511.	83.	100.	83.	97.	460.	3380.	468.	383.	482.	47.	637.	230.	51.
35	93685.	1189.	114.	61.	54.	61.	285.	2028.	299.	228.	272.	26.	379.	151.	30.
40	91054.	361.	190.	41.	37.	41.	182.	1270.	187.	143.	180.	19.	237.	87.	22.
45	86062.	16.	282.	32.	28.	33.	149.	961.	150.	102.	136.	15.	173.	67.	16.
50	81977.	0.	477.	29.	31.	31.	127.	789.	108.	75.	103.	15.	140.	53.	11.
55	69435.	0.	610.	21.	28.	27.	106.	617.	73.	51.	69.	11.	106.	45.	10.
60	65867.	0.	981.	19.	28.	27.	108.	591.	59.	36.	53.	12.	89.	39.	9.
65	57614.	0.	1362.	20.	26.	28.	117.	586.	67.	35.	56.	10.	104.	41.	8.
70	44742.	0.	1709.	16.	18.	21.	89.	469.	73.	35.	62.	6.	87.	32.	5.
75	31337.	0.	2055.	13.	13.	14.	66.	388.	62.	34.	52.	6.	75.	29.	1.
80	18506.	0.	1940.	9.	9.	10.	45.	289.	45.	29.	38.	5.	53.	20.	0.
85	11008.	0.	2230.	8.	7.	7.	30.	240.	37.	25.	30.	5.	38.	14.	0.
total	1601045.	23349.	12758.	1490.	1185.	1242.	6285.	43533.	6274.	5108.	6255.	629.	7355.	2784.	599.

region utrecht

age	population	births	deaths	migration from utrecht to groning	friesl.	drenthe	overijsgelderl.	utrecht	n.holl	z.holl	zeeland	n.brab	limburgijs.+dr.
0	70744.	0.	175.	66.	81.	78.	168.	723.	1849.	535.	575.	59.	323.	79.	38.
5	75053.	0.	28.	50.	67.	66.	129.	563.	1446.	411.	419.	44.	264.	67.	30.
10	76250.	0.	19.	42.	55.	56.	103.	456.	1183.	306.	324.	30.	209.	53.	21.
15	73524.	475.	52.	98.	81.	71.	158.	801.	2599.	824.	693.	46.	255.	64.	19.
20	76469.	3434.	45.	185.	195.	162.	426.	1822.	5386.	1893.	1833.	126.	698.	176.	51.
25	74531.	5128.	46.	120.	148.	133.	325.	1385.	3893.	1312.	1355.	103.	614.	160.	55.
30	55444.	1819.	54.	56.	70.	71.	148.	680.	1857.	583.	595.	47.	317.	77.	27.
35	49396.	555.	49.	34.	44.	44.	89.	397.	1153.	338.	327.	25.	184.	49.	15.
40	47535.	152.	94.	25.	33.	32.	62.	268.	777.	228.	233.	20.	124.	31.	12.
45	45962.	12.	169.	20.	26.	27.	52.	209.	642.	168.	182.	16.	93.	24.	9.
50	44487.	0.	232.	19.	31.	26.	47.	182.	490.	130.	146.	17.	80.	21.	7.
55	37782.	0.	355.	14.	27.	23.	39.	142.	329.	88.	97.	13.	60.	17.	6.
60	35019.	0.	502.	13.	27.	23.	40.	137.	271.	62.	75.	13.	51.	15.	5.
65	30112.	0.	718.	11.	22.	21.	37.	118.	267.	54.	69.	10.	52.	14.	4.
70	23781.	0.	911.	7.	13.	13.	24.	78.	241.	44.	63.	5.	36.	9.	2.
75	17169.	0.	1108.	7.	10.	10.	20.	73.	227.	48.	60.	6.	35.	9.	1.
80	10213.	0.	1036.	5.	8.	7.	15.	59.	182.	45.	47.	5.	27.	7.	0.
85	5795.	0.	1081.	4.	5.	4.	8.	38.	114.	30.	29.	4.	15.	4.	0.
total	849266.	11575.	6674.	776.	943.	867.	1890.	8131.	22906.	7099.	7122.	589.	3437.	876.	302.

region n.holl

age	population	births	deaths	migration from n.holl to groning	friesl.	drenthe	overijsgelderl.	utrecht	n.holl	z.holl	zeeland	n.brab	limburgijs.+dr.
0	168702.	0.	442.	174.	258.	168.	315.	655.	840.	6106.	971.	124.	477.	159.	332.
5	184172.	0.	47.	136.	220.	145.	247.	524.	675.	4815.	726.	95.	400.	139.	263.
10	188443.	0.	53.	107.	174.	118.	190.	407.	530.	3444.	539.	62.	304.	105.	181.
15	181770.	1100.	122.	219.	220.	131.	253.	622.	1013.	8059.	1003.	83.	323.	111.	138.
20	192418.	8720.	129.	385.	492.	277.	633.	1311.	1944.	17148.	2457.	211.	817.	281.	350.
25	205469.	12852.	130.	294.	439.	266.	566.	1168.	1647.	13935.	2129.	202.	844.	300.	438.
30	150249.	4325.	100.	154.	233.	160.	289.	642.	879.	6927.	1046.	104.	487.	161.	246.
35	130628.	1080.	162.	94.	151.	101.	180.	387.	563.	4143.	594.	58.	291.	106.	142.
40	128656.	235.	253.	65.	106.	69.	117.	246.	358.	2637.	398.	43.	185.	62.	105.
45	129628.	15.	431.	55.	87.	61.	103.	202.	310.	2037.	327.	36.	146.	52.	87.
50	130306.	0.	696.	58.	115.	67.	104.	195.	264.	1758.	292.	42.	139.	49.	67.
55	115407.	0.	1025.	49.	118.	68.	100.	176.	206.	1379.	225.	37.	122.	47.	69.
60	107470.	0.	1601.	57.	149.	85.	129.	213.	212.	1225.	217.	49.	129.	52.	80.
65	93750.	0.	2224.	56.	138.	86.	135.	205.	234.	1177.	223.	42.	147.	53.	70.
70	74320.	0.	2903.	37.	79.	53.	86.	137.	212.	973.	208.	21.	103.	35.	36.
75	52918.	0.	3387.	26.	49.	31.	55.	98.	154.	820.	152.	19.	76.	27.	9.
80	31059.	0.	3275.	17.	32.	20.	35.	67.	104.	645.	100.	12.	50.	18.	3.
85	17321.	0.	3442.	12.	17.	10.	17.	40.	60.	404.	57.	9.	26.	9.	2.
total	2282686.	28327.	20422.	1995.	3077.	1916.	3554.	7295.	10205.	77632.	11664.	1249.	5066.	1766.	2618.

region z.holl

age	population	births	deaths	migration from z.holl to groning	friesl.	drenthe	overijsgelderl.	utrecht	n.holl	z.holl	zeeland	n.brab	limburgijs.+dr.
0	235610.	0.	493.	211.	192.	234.	319.	921.	785.	1010.	9520.	375.	1379.	229.	86.
5	249198.	0.	103.	177.	175.	215.	268.	789.	675.	853.	7627.	308.	1239.	215.	73.
10	252887.	0.	49.	132.	131.	167.	196.	582.	503.	579.	5371.	191.	893.	155.	48.
15	241650.	1739.	132.	254.	156.	173.	245.	835.	903.	1271.	9384.	241.	892.	153.	34.
20	247142.	12764.	129.	424.	331.	347.	581.	1669.	1645.	2567.	21808.	577.	2139.	367.	82.
25	263488.	17168.	162.	329.	301.	340.	529.	1516.	1420.	2126.	19250.	564.	2250.	400.	105.
30	196210.	5775.	147.	177.	164.	210.	277.	856.	778.	1085.	9713.	298.	1333.	221.	60.
35	175520.	1801.	226.	115.	113.	141.	183.	546.	528.	687.	5841.	176.	845.	154.	37.
40	173412.	431.	321.	80.	80.	96.	119.	349.	337.	439.	3930.	131.	538.	91.	27.
45	169876.	34.	600.	63.	60.	78.	97.	264.	270.	314.	2981.	100.	393.	70.	21.
50	169242.	0.	861.	61.	75.	81.	92.	239.	214.	253.	2488.	110.	350.	61.	15.
55	150073.	0.	1290.	53.	77.	83.	90.	219.	169.	201.	1946.	99.	311.	60.	16.
60	143602.	0.	1982.	56.	90.	96.	106.	243.	161.	164.	1726.	120.	303.	61.	17.
65	124688.	0.	2970.	52.	78.	91.	104.	220.	166.	148.	1666.	96.	324.	58.	14.
70	96911.	0.	3581.	31.	40.	49.	59.	130.	134.	109.	1375.	43.	200.	34.	6.
75	67107.	0.	3974.	23.	27.	32.	41.	102.	106.	100.	1098.	42.	163.	28.	2.
80	39219.	0.	3930.	15.	17.	21.	26.	70.	72.	79.	728.	28.	107.	19.	1.
85	22690.	0.	4409.	11.	10.	11.	14.	45.	45.	53.	444.	22.	59.	10.	0.
total	3018525.	39712.	25359.	2264.	2117.	2465.	3346.	9595.	8911.	12038.	106896.	3521.	13718.	2386.	644.

APPENDIX F *Continued.*

region zeeland

age	population	births	deaths	migration from zeeland to groning	friesl.	drenthe	overijsgelderl.	utrecht	n.holl	z.holl	zeeland	n.brab	limburg	ijs.+dr.
0	27282.	0.	68.	10.	9.	9.	19.	56.	40.	71.	171.	849.	166.	15.	9.
5	28049.	0.	10.	8.	8.	9.	16.	50.	35.	62.	140.	715.	153.	15.	8.
10	26742.	0.	11.	6.	6.	6.	11.	36.	26.	41.	97.	435.	108.	10.	5.
15	25447.	246.	20.	21.	13.	12.	26.	94.	83.	164.	308.	997.	196.	19.	7.
20	23450.	1593.	19.	26.	20.	18.	45.	137.	111.	243.	525.	1752.	345.	33.	12.
25	25405.	1832.	21.	14.	13.	12.	28.	86.	66.	139.	319.	1178.	250.	25.	10.
30	19584.	575.	11.	7.	6.	7.	14.	45.	34.	66.	151.	582.	139.	13.	6.
35	17539.	212.	26.	5.	5.	5.	10.	31.	24.	45.	96.	365.	93.	9.	4.
40	17415.	64.	27.	3.	3.	3.	6.	17.	14.	25.	58.	243.	53.	5.	2.
45	17343.	4.	54.	3.	2.	3.	5.	14.	12.	20.	48.	202.	42.	4.	2.
50	18234.	0.	107.	2.	3.	3.	4.	12.	9.	14.	36.	199.	34.	3.	1.
55	16103.	0.	131.	2.	2.	2.	4.	9.	6.	10.	25.	159.	26.	3.	1.
60	16217.	0.	199.	2.	3.	3.	4.	10.	6.	8.	21.	185.	25.	3.	1.
65	14693.	0.	324.	2.	3.	3.	5.	10.	6.	8.	23.	165.	29.	3.	1.
70	12137.	0.	398.	2.	2.	2.	4.	10.	9.	10.	32.	124.	31.	3.	1.
75	8588.	0.	486.	1.	1.	1.	3.	7.	6.	8.	22.	105.	21.	2.	0.
80	5231.	0.	468.	1.	1.	1.	2.	6.	5.	8.	19.	94.	19.	2.	0.
85	3432.	0.	624.	1.	1.	1.	2.	5.	4.	7.	15.	97.	14.	1.	0.
total	322891.	4526.	3004.	116.	101.	100.	208.	635.	496.	949.	2106.	8446.	1744.	168.	70.

region n.brab

age	population	births	deaths	migration from n.brab to groning	friesl.	drenthe	overijsgelderl.	utrecht	n.holl	z.holl	zeeland	n.brab	limburg	ijs.+dr.
0	168683.	0.	414.	42.	34.	33.	97.	510.	195.	231.	466.	160.	5310.	389.	10.
5	187072.	0.	72.	33.	29.	29.	77.	413.	159.	185.	353.	124.	4512.	346.	8.
10	189204.	0.	60.	27.	24.	24.	61.	329.	128.	136.	268.	83.	3513.	269.	6.
15	173292.	1251.	143.	99.	54.	48.	146.	901.	439.	569.	896.	201.	6700.	508.	8.
20	164957.	8204.	127.	146.	102.	86.	308.	1604.	711.	1022.	1852.	427.	14298.	1083.	17.
25	164794.	12805.	93.	77.	63.	57.	190.	988.	416.	574.	1109.	283.	10201.	800.	15.
30	133167.	4305.	95.	35.	29.	30.	84.	471.	193.	247.	473.	126.	5109.	373.	7.
35	120946.	1288.	150.	22.	19.	19.	54.	293.	128.	153.	277.	73.	3158.	254.	4.
40	115126.	335.	222.	15.	14.	13.	35.	187.	81.	97.	186.	54.	2003.	149.	3.
45	102058.	22.	359.	12.	10.	10.	28.	135.	62.	67.	135.	40.	1403.	110.	2.
50	93054.	0.	531.	10.	11.	9.	23.	109.	44.	48.	100.	39.	1111.	86.	1.
55	75554.	0.	763.	7.	9.	7.	17.	77.	27.	29.	60.	27.	757.	65.	1.
60	69120.	0.	1049.	7.	9.	8.	19.	79.	23.	22.	50.	30.	687.	61.	1.
65	58442.	0.	1572.	6.	8.	8.	19.	71.	24.	20.	48.	24.	728.	57.	1.
70	43297.	0.	1751.	5.	6.	6.	15.	60.	28.	21.	56.	15.	645.	48.	1.
75	27599.	0.	1878.	4.	4.	4.	12.	52.	24.	21.	50.	17.	578.	45.	0.
80	15324.	0.	1728.	2.	3.	2.	7.	32.	15.	15.	30.	10.	344.	27.	0.
85	8658.	0.	1659.	2.	2.	1.	4.	23.	10.	11.	20.	9.	212.	16.	0.
total	1910347.	28210.	12666.	551.	430.	394.	1196.	6334.	2707.	3468.	6429.	1742.	61269.	4686.	85.

region limburg

age	population	births	deaths	migration from limburg to groning	friesl.	drenthe	overijsgelderl.	utrecht	n.holl	z.holl	zeeland	n.brab	limburg	ijs.+dr.
0	79735.	0.	212.	17.	11.	12.	34.	219.	77.	105.	127.	33.	449.	2641.	5.
5	95222.	0.	30.	12.	9.	9.	25.	163.	57.	77.	88.	24.	350.	2150.	4.
10	102304.	0.	31.	11.	8.	9.	22.	144.	51.	63.	74.	18.	303.	1858.	3.
15	97232.	744.	70.	54.	25.	23.	69.	526.	234.	352.	331.	57.	770.	4681.	5.
20	88136.	4057.	70.	68.	39.	34.	122.	785.	318.	530.	573.	102.	1377.	8368.	9.
25	84011.	5419.	55.	32.	21.	20.	67.	428.	165.	263.	304.	60.	870.	5476.	7.
30	71086.	1893.	56.	15.	10.	11.	31.	213.	80.	118.	135.	28.	454.	2659.	4.
35	65792.	638.	81.	9.	7.	7.	19.	129.	51.	71.	77.	16.	273.	1766.	2.
40	64097.	148.	127.	7.	5.	5.	13.	86.	34.	48.	55.	12.	183.	1088.	2.
45	60314.	17.	233.	5.	3.	4.	10.	58.	24.	30.	37.	8.	119.	747.	1.
50	56595.	0.	359.	5.	4.	4.	9.	53.	20.	25.	31.	9.	107.	662.	1.
55	45346.	0.	455.	3.	4.	3.	7.	40.	13.	16.	20.	7.	78.	534.	1.
60	40779.	0.	652.	3.	4.	3.	8.	38.	10.	11.	15.	7.	66.	470.	1.
65	33082.	0.	919.	3.	3.	3.	7.	32.	10.	10.	14.	5.	65.	412.	0.
70	24798.	0.	1106.	2.	2.	2.	5.	27.	11.	10.	16.	3.	57.	340.	0.
75	16556.	0.	1163.	2.	1.	1.	4.	20.	9.	9.	12.	3.	44.	274.	0.
80	8651.	0.	979.	1.	1.	1.	3.	17.	7.	8.	10.	2.	35.	218.	0.
85	4517.	0.	926.	1.	1.	1.	1.	10.	4.	5.	6.	2.	18.	110.	0.
total	1038253.	12916.	7524.	250.	158.	152.	456.	2988.	1175.	1751.	1925.	396.	5618.	34454.	45.

region ijs.+dr.

age	population	births	deaths	migration from ijs.+dr. to groning	friesl.	drenthe	overijsgelderl.	utrecht	n.holl	z.holl	zeeland	n.brab	limburg	ijs.+dr.
0	3548.	0.	12.	8.	8.	9.	39.	30.	9.	17.	8.	2.	5.	1.	23.
5	3392.	0.	1.	7.	8.	10.	38.	30.	9.	16.	8.	2.	5.	1.	23.
10	2670.	0.	2.	7.	7.	9.	33.	26.	8.	13.	6.	2.	5.	1.	18.
15	1915.	19.	1.	13.	9.	9.	42.	38.	15.	30.	11.	2.	5.	1.	13.
20	2073.	217.	4.	15.	13.	13.	70.	53.	19.	42.	18.	3.	8.	1.	22.
25	2904.	281.	1.	9.	9.	10.	51.	39.	13.	28.	13.	3.	7.	1.	23.
30	2126.	81.	2.	5.	5.	7.	28.	23.	8.	15.	7.	1.	4.	1.	14.
35	1688.	24.	1.	4.	4.	5.	21.	17.	6.	11.	5.	1.	3.	0.	9.
40	1422.	6.	3.	3.	3.	3.	13.	10.	4.	7.	3.	1.	2.	0.	7.
45	1138.	0.	1.	2.	2.	2.	8.	6.	2.	4.	2.	0.	1.	0.	4.
50	967.	0.	5.	1.	1.	1.	5.	4.	1.	2.	1.	0.	1.	0.	2.
55	605.	0.	7.	1.	2.	2.	8.	5.	1.	2.	1.	0.	1.	0.	3.
60	263.	0.	3.	1.	1.	1.	3.	2.	0.	1.	0.	0.	0.	0.	1.
65	121.	0.	3.	0.	1.	1.	3.	2.	0.	1.	0.	0.	0.	0.	1.
70	50.	0.	2.	0.	0.	0.	1.	1.	0.	0.	0.	0.	0.	0.	0.
75	25.	0.	1.	0.	0.	0.	1.	1.	0.	0.	0.	0.	0.	0.	0.
80	18.	0.	3.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
85	10.	0.	3.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
total	24935.	628.	55.	76.	73.	82.	364.	287.	95.	189.	83.	17.	47.	7.	163.

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