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Migration and Settlement in the F.R.G

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MIGRATION AND SETTLEMENT IN THE FEDERAL REPUBLIC OF GERMANY

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Preface

To promote international scientific cooperation and to disseminate research results, the Migration and Settlement Task of the Human Settlements and Services Area at IIASA initiated a comparative analysis of patterns of interregional migration and spatial population growth in National Member Organization Countries. To carry out the study, a network of national scholars was established, an integrated methodology for multiregional demographic analysis was developed and a package of computer programs to implement this methodology was written. The contributors were invited to prepare reports on migration and settlement in their respective countries. An outline was provided and computer analysis was done by IIASA. The results of the various case studies will be discussed at a Conference to be held in September, 1978.

This study on migration and settlement in the Federal Republic of Germany was prepared by Dr. Reinhold Koch and Dr. H.P. Gatzweiler of the Bundesforschungsanstalt für Landeskunde und Raumordnung, Bonn - Bad Godesberg. It uses the Länder (counties) as regional units for the analysis. The report was originally written in German and translated by members of the Migration and Settlement Task. This English translation was not seen by the authors. Therefore, errors which may have been introduced during the translation are not their responsibility.

Frans Willekens
Leader
Migration and
Settlement Task

August 1978

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MIGRATION AND SETTLEMENT IN THE FEDERAL REPUBLIC OF GERMANY - TRENDS AND OBJECTIVES

1. Introduction

Settlement Pattern and Population Dynamics

According to estimates of the Central Statistical Office some 8 million people (14%) in the Federal Republic of Germany have moved over the past thirty years. Slightly more than half of them have thereby crossed the border of a municipality, and have thus, according to statistical definition undertaken a migration. In order to answer the question how these migratory movements of the past have influenced, and will influence, population development and settlement patterns, several methodological steps are required.

First, a short description of the settlement pattern in the FRG (1.1.) and an analysis of the influence of migrations on population development are offered on a global level (1.2). Then follows a description of regional population structures and developments (2). To enable us to estimate the future development of settlemnt patterns and population, methods of regional population analysis (3), further methods for trend-projections and labor-market oriented models of forecast are used (4.). This permits an evaluation of the efficiency of multiregional population analysis. Presumptive population development and distribution will be set off against population-relevant objectives of regional planning and state planning (5.)

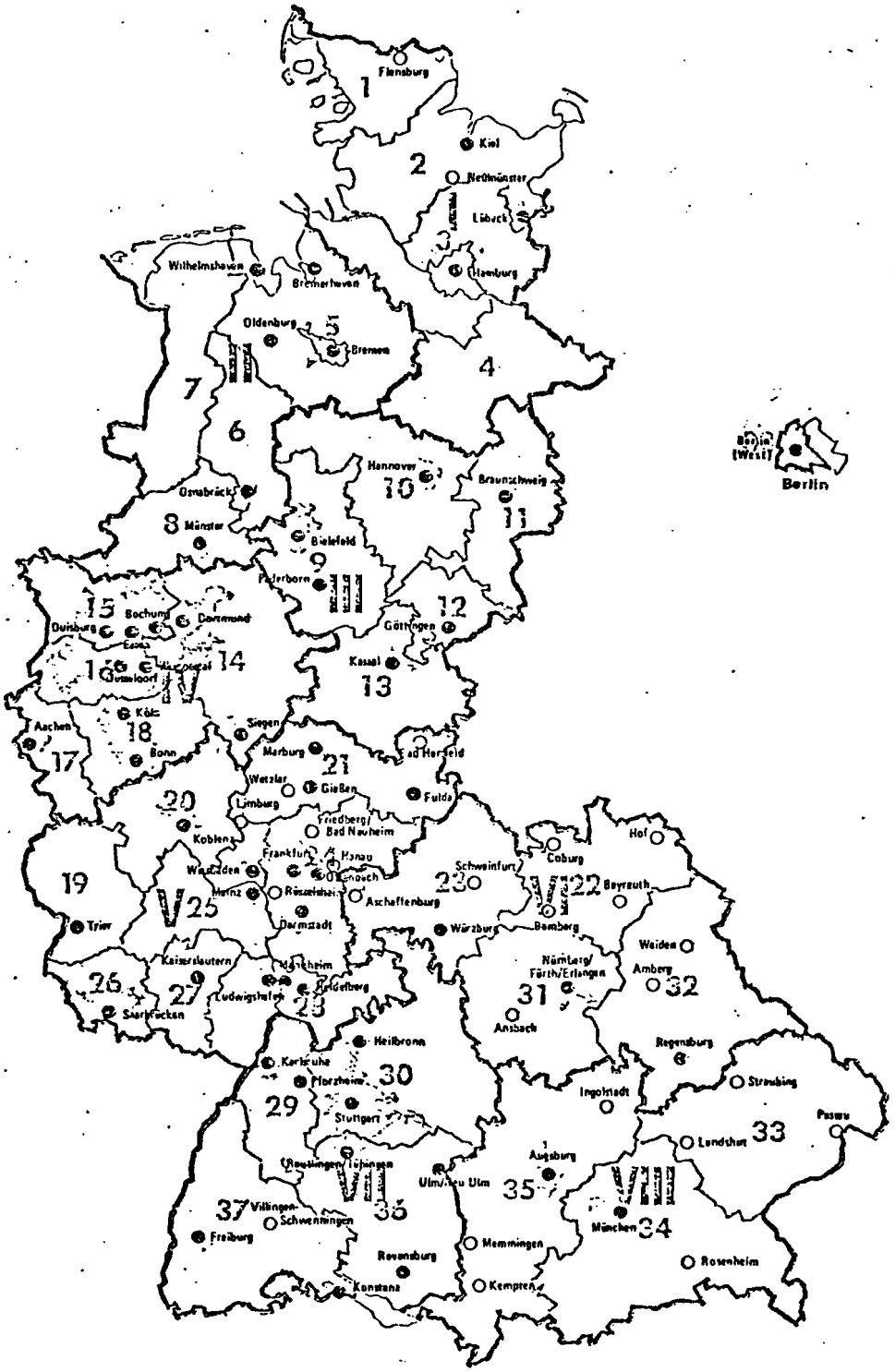
1.1 Settlement Pattern

With its population density of approximately 247 inhabitants per sq.km the FRG is one of the most densely populated countries in Europe. The urbanization process found all over the world is relatively far advanced in the FRG; it is, however, not con-

Map 1-1. Regional units for the regional planning program, urban areas and higher centers.

Karte 1-1:

Großregionen, Gebietseinheiten für das Bundesraumordnungsprogramm, Verdichtungsräume und Oberzentren



Quelle: ROB 1974

VI Grenze und Nummer der Großregionen

12 Grenze und Nummer der Gebietseinheiten für das Bundesraumordnungsprogramm Verdichtungsräume

● Oberzentren (higher centers)

○ Zentrale Orte mit Teilfunktionen eines Oberzentrums

centrated in one single dominant economic or administrative metropolitan area. Typical features of the FRG's regional structure are a number of large, economically strong and viable centers. They are evenly distributed over the entire territory and thus offer particular structural advantages when compared with other European countries.

Agglomerations have formed around these big centers, where metropolitan job-markets, infrastructure and services are available. These big centers, such as Hamburg, Düsseldorf, Frankfurt, and Munich, beyond their major functions for the neighboring agglomerations, also fulfill important tasks and specific, locally-bound functions in various fields, i.e. local government, cultural, and economic activities. In accordance with their respective hinterland, these agglomerations have corresponding rural areas (Map 1-1). Thus we obtain eight so-called Grossregionen (Major Regions). These Grossregionen show an almost evenly balanced structure regarding their population distribution and labor force, whether measured in terms of area, inhabitants, employment structure, or in terms of the development since 1961 (Table 1-1).

Table 1-1. Surface and population size in regions.

Tab. 1-1: Fläche und Wohnbevölkerung in den Großregionen

Gebietsstand VZ 1970	Surface Fläche	Population Wohnbevölkerung				
		absolut			Veränderung change	
Großregion		1961 [1]	1970 [1]	1985 [2]	1961/1970	1970/1985 [2]
	in qkm	in 1 000			in %	
I	27 125	5 037,2	5 239,9	5 161	+ 4,0	− 1,5
II	25 905	3 970,0	4 321,7	4 340	+ 8,9	+ 0,4
III	29 029	5 911,7	6 266,7	6 400	+ 6,0	+ 2,1
IV	22 614	13 355,7	14 101,0	14 083	+ 5,6	− 0,1
V	39 981	9 385,8	10 284,9	10 458	+ 9,6	+ 1,7
VI	33 362	4 466,3	4 765,3	4 794	+ 6,7	+ 0,6
VII	32 900	6 811,6	7 834,6	8 486	+15,0	+ 8,3
VIII	37 185	5 049,1	5 714,1	6 043	+13,2	+ 5,8

Quelle: [1]) Statistisches Bundesamt
[2]) PROGNOS AG, Prognose der Arbeitsplatzzahl und der Bevölkerung in den 38 Gebietseinheiten für das Bundesraumordnungsprogramm 1970 bis 1985, Basel, Dezember 1974

The Grossregionen and their main centers are easily accessible. By means of Europe's important axes they are linked to the internationally and nationally significant traffic routes, although these important European axes generally run in a North-South direction. East-West situated are the axes of Aachen-Ruhr, Hannover-Berlin, and of Saabrücken-Stuttgart-Munich.

Below the level of Grossregionen it is the distribution of so-called higher centers (Oberzentren) that determines the settlement structure and quality of regional living conditions. Here we find considerable differences in availability of infra-structure and services. Several districts do not have such a higher center. The distances of the areas of Emsland, Lüneburger Heide, north-east and eastern Bavaria, West-Mittelfranken, and Allgäu to the nearest higher centers, are, however, still reasonable.

There are significant differences in the infrastructure and the employment strucutre between these peripheral, thinly populated areas and the agglomerations. In 1975, there was, for example, one medical specialist for 1,500 inhabitants in rural areas, while in densely populated areas it was one for 900. In rural areas the average monthly income of an industrial worker was about 400 German marks below that of an industrial worker in an agglomeration.

The terms of Grossregionen, and regional centers, which are used here for describing the settlement pattern in the FRG are hardly ever used in policy making. The territorial units of the FRG are the counties (Bundesländer)(Table 1-2).

The county with the largest area is Bavaria, whereas the most densely populated is Nordrhein-Westphalia. The differences in area and population of the counties are the result of historic events. Many counties, such as Bavaria and the townships of Bremen and Hamburg have a long history. Other counties, such as Rheinland-Pfalz and Nieder-Sachsen were established only after 1945. Baden-Württemberg was established by plebiscite in 1952, and the Saarland joined the FRG as late as 1957.

Table 1-2. Surface and population size of county - capital

Tab. 1-2: Bundesländer - Hauptstadt, Fläche, Einwohner

Baden-Württemberg	Stuttgart	35.749 qkm	9,2 Mill.
Bayern	München	70.547 qkm	10.8 Mill.
Bremen	Stadtstaat	404 qkm	0.7 Mill.
Hamburg	Stadtstaat	753 qkm	1.7 Mill.
Hessen	Wiesbaden	21.110 qkm	5.4 Mill.
Niedersachsen	Hannover	47.407 qkm	7.2 Mill.
Nordrhein-Westfalen	Düsseldorf	34.004 qkm	17.1 Mill.
Rheinland-Pfalz	Mainz	19.883 qkm	3.7 Mill.
Saarland	Saarbrücken	2.568 qkm	1.1 Mill.
Schleswig-Holstein	Kiel	15.678 qkm	2.5 Mill.

The Federation, the counties and the municipalities have their own governments. Each of these governments have well defined and limited tasks and competences, which only in exceptional cases are subjected to instruction by the next highest level. This system of federal organization which integrates all communal and local governments has vitally contributed to the FRG's relatively balanced settlement pattern with its variety of centers of political and economic activities.

Collection of statistical data is part of the administrative task, which is largely within the competence of the counties. Therefore, sectorally disaggregated data can be obtained on the state and county level without major difficulty.

1.2. Population Dynamics

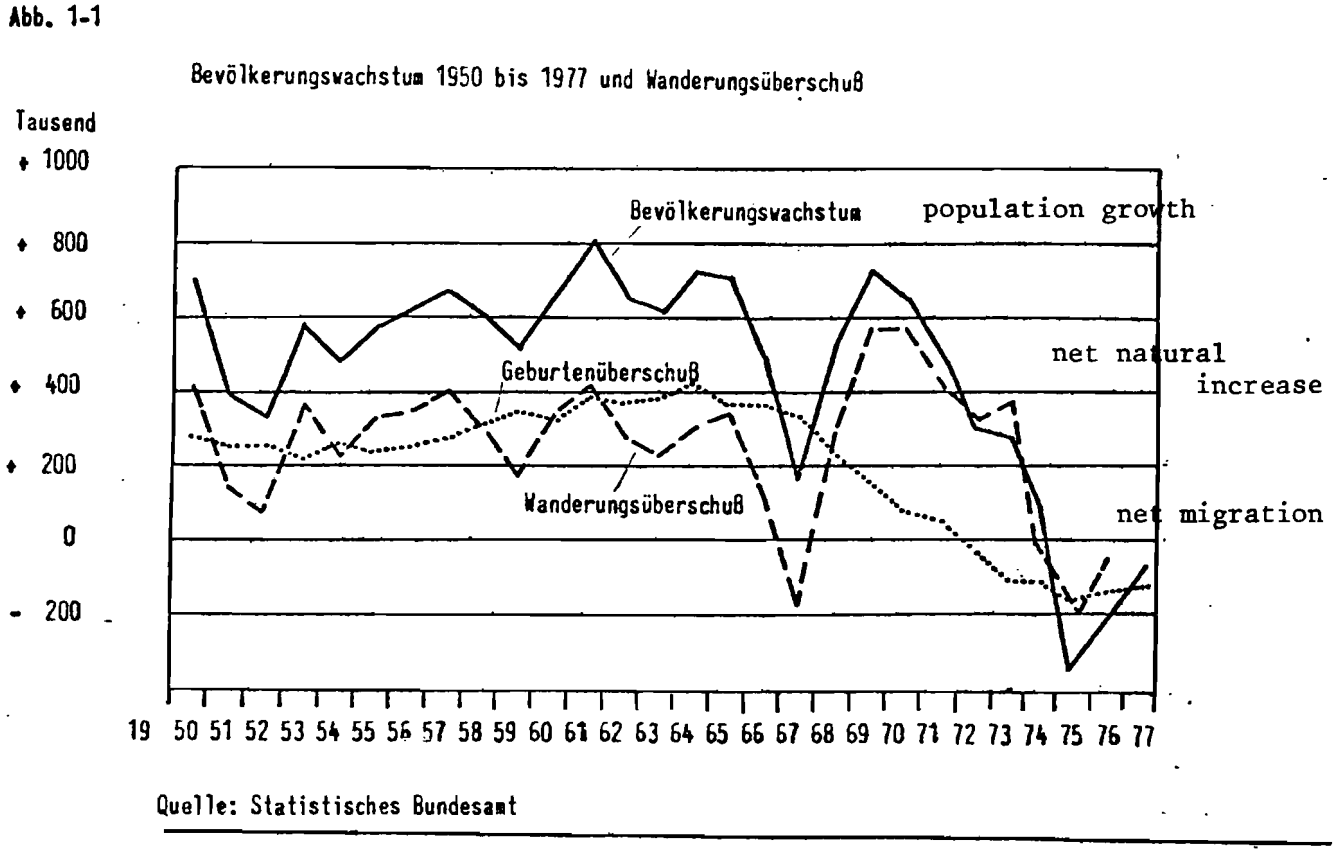
According to the population census of December 31, 1977, there were 61,4 million people in the FRG. This is an increase of 21 % since 1950, when the population was 50,8 million. However, the figures obtained in 1977 are 700,000 below the population peak of 1973. Between 1950 and 1970 the FRG had the fourth highest growth rate (19.4 %) of all European states, after Switzerland, the Netherlands and France.

Disregarding the general trends which are typical for all populations undergoing demographical and social changes in the course of the urbanization process, this population increase was determined by the following factors (BIB, 1974, p.11):

- The First and the Second World War,
- the population shifts after both wars,
- the fluctuations of large portions of the population between the GDR and the FRG and within the federal territory connected with the integration of refugees, and
- the immigration of foreign labor force into the territory.

Between the censuses of 1939 and 1950 the population increase was mainly due to immigration. Between 1950 and 1961, however, the major contributing factor to the increase was natural population growth. The excess of births within this period added up to a total of 3 million and the gain by migration to 2,4 million. This means an average annual population growth rate of 0.92%.

Figure 1-1. Population growth 1950 to 1977 and net migration.



Between the censuses of 1961 and 1970 the population growth slowed down. In that period the average annual growth rate was 0.85 %. In spite of the decrease in births that began in 1964 this low growth rate cannot be explained through natural change only. The number of children born was 2,9 million and almost as high as during 1950-1961. The gain through migration had fallen to 1,6 million, which is only 35,7 % of the total gain as opposed to 44,7 % in the period of 1950-1961.

The annual changes of population development are determined mainly by the strong shifts in migration. Until 1967 the excess of births had, as a rule, been above the gain due to migration; from 1968 onwards the balance of natural population movements lagged behind that of migratory movements. Since 1953 the curve of the annual excess of births rose with slight shifts, reached its peak in 1964 and since then has shown a steady decline. In 1972, there was the first negative balance of births and deaths. In 1977, this balance was -122,000. After large gains due to migration in the early seventies, the migratory balance became negative in the period 1974-1976; in 1975 the total loss was 200,000 people, when some 600,000 foreigners left the FRG because of the economic recession. In 1977 the migratory balance was again positive with a gain of 32,000.

1.2.1 Dynamics of Births

In 1950, a total of 813,000 children were born in the FRG. In 1953, the number of live births fell to 769,000. The larger number of births in 1950 may be explained by postponed gratification ("Nachholdbedarf"). Many children, born around 1950, would have been born earlier if their fathers were not in war or captivity. A process of normalization followed after 1950 and caused a decline of births. Later, an increase in births occurred, because of the high incidence of marriages after the war, the lower marital age and the large number of persons reaching ages 20-30 with highest fertility. Thus the number of live-births increased to 1,07 million by 1964, and the crude birth rate reached its peak with a value of 28.3 per thousand. After

an initially light drop, the number of births annually declined, since 1966, by 5 %. In 1977, about 483,000 fewer children were born than in 1964. The crude birth rate was 9.5 per thousand. Because of this heavy decrease of about 45 % in 14 years, the FRG now has been reduced to the lowest rank among the industrialized countries. Almost 15 % of the children born in 1977 were of foreign nationality.

Table 1-3. Marriages, births and deaths 1950-1977.

Tab. 1-3: Eheschließungen, Geborene und Gestorbene 1950 - 1977

year Jahr	marriages Ehe-schließungen	live born Lebend-geborene	dead born Totgeborene	Gestorbene[1] deaths	
				total insgesamt	darunter infant im 1. Lebensjahr
1950	535 708	812 835	18 118	528 747	45 252
1951	522 946	795 608	17 790	543 897	42 372
1952	483 358	799 080	17 145	545 963	38 624
1953	462 101	796 096	16 456	578 027	37 069
1954	453 168	816 028	16 779	555 459	35 171
1955	461 818	820 128	16 558	581 872	34 224
1956	478 352	855 887	16 129	599 413	33 098
1957	482 590	892 228	15 911	615 016	32 479
1958	494 110	904 465	15 082	597 305	32 589
1959	503 981	951 942	14 951	605 504	32 642
1960	521 445	968 629	15 049	642 962	32 724
1961	529 901	1 012 687	14 704	627 561	32 108
1962	530 640	1 018 552	14 361	644 819	29 807
1963	507 644	1 054 123	13 991	673 069	28 473
1964	506 182	1 065 437	13 590	644 128	26 948
1965	492 128	1 044 328	12 901	677 628	24 947
1966	484 562	1 050 345	12 174	686 321	24 803
1967	483 101	1 019 459	11 422	687 349	23 303
1968	444 150	969 825	10 702	734 048	22 110
1969	446 586	903 456	9 693	744 360	21 162
1970	444 510	810 808	8 351	734 843	19 165
1971	432 030	778 526	7 674	730 670	18 141
1972	415 132	701 214	6 557	731 264	15 907
1973	394603	635633	5686	731028	14569
1974	377265	626373	5387	727511	13232
1975	386681	600512	4689	749260	11875
1976	365728	602851	4444	733140	10506
1977[2]	358347	582348	3795	704922	9022

+) Ohne Totgeborene, nachträglich beurkundete Kriegssterbefälle und gerichtliche Todeserklärungen.
2) Vorläufige Ergebnisse
Quelle: Statistisches Jahrbuch für die Bundesrepublik Deutschland 1969.S.44. 1973,S.54, 1977,S.68

Two demographic factors have promoted the decline in births during the past years. First, the thinly populated age groups of postwar years have reached marital age within the last ten years (Koch, 1976, 4.02). About 25 % of the decrease in births

since the mid-sixties is due to the age-structure. Another 16 % of the decrease in births can be explained by the longer time allowed between births in a marriage. Thus 60 % of the decline in births is caused by a real reduction in fertility. This is confirmed when observing the development of the net-reproduction rate between 1961 and 1975; in that period it fell from 1,14 to 0,68.

Table 1-4. General and marital fertility rates 1950-1975

Tab. 1-4: Allgemeine (1) und eheliche (2) Fruchtbarkeitsraten 1950 - 1975

year / Jahr	Lebendgeborene auf			
	1 000 Frauen im Alter von 15 bis unter 45 Jahren (1)		1 000 verheiratete Frauen im Alter von 15 bis unter 45 Jahren (2)	
	Anzahl	1950 = 100	Anzahl	1950 = 100
1950	69,5[1])	100	121[1])	100
1951	68,1[1])	98,0	.	.
1952	67,4	97,0	.	.
1953	67,2	96,7	.	.
1954	68,5	98,6	.	.
1955	68,4	98,4	.	.
1956	71,4	102,7	.	.
1957	75,0	107,9	124[1])	102,5
1958	76,1	109,5	123[1])	101,7
1959	80,3	115,5	130[2])	107,4
1960	81,8	117,7	130[2])	107,4
1961	85,9	123,6	133[2])	109,9
1962	85,1	122,4	128	105,8
1963	87,0	125,2	124	102,5
1964	86,8	124,9	124	102,5
1965	85,2	122,6	121	100,0
1966	85,9	123,6	121	100,0
1967	84,0	120,9	117	96,7
1968	80,0	115,1	111	91,7
1969	74,4	107,1	103	85,1
1970	67,2	96,7	92	76,0
1971	63,9	91,9	88	72,7
1972	56,7	81,6	83	68,6
1973	50,8	73,1	75	62,0
1974	49,7	71,5	75	62,0
1975	47,5	68,3	73	60,3

Table 1-5. Net-reproduction rates 1961-1975.

Tab. 1-4: Nettoreproduktionsraten 1961 - 1975

Jahr	Total population / Gesamtbevölkerung	German population / Deutsche Bevölkerung
1961	1,14	1,14 *
1966	1,19	1,18 *
1970	0,95	0,94
1971	0,90	0,89
1972	0,81	0,78
1973	0,73	0,69
1974	0,71	0,67
1975	0,68	0,64

* geschätzt

Quelle: Schwarz, 1977, 387

1.2.2 Dynamics of Deaths

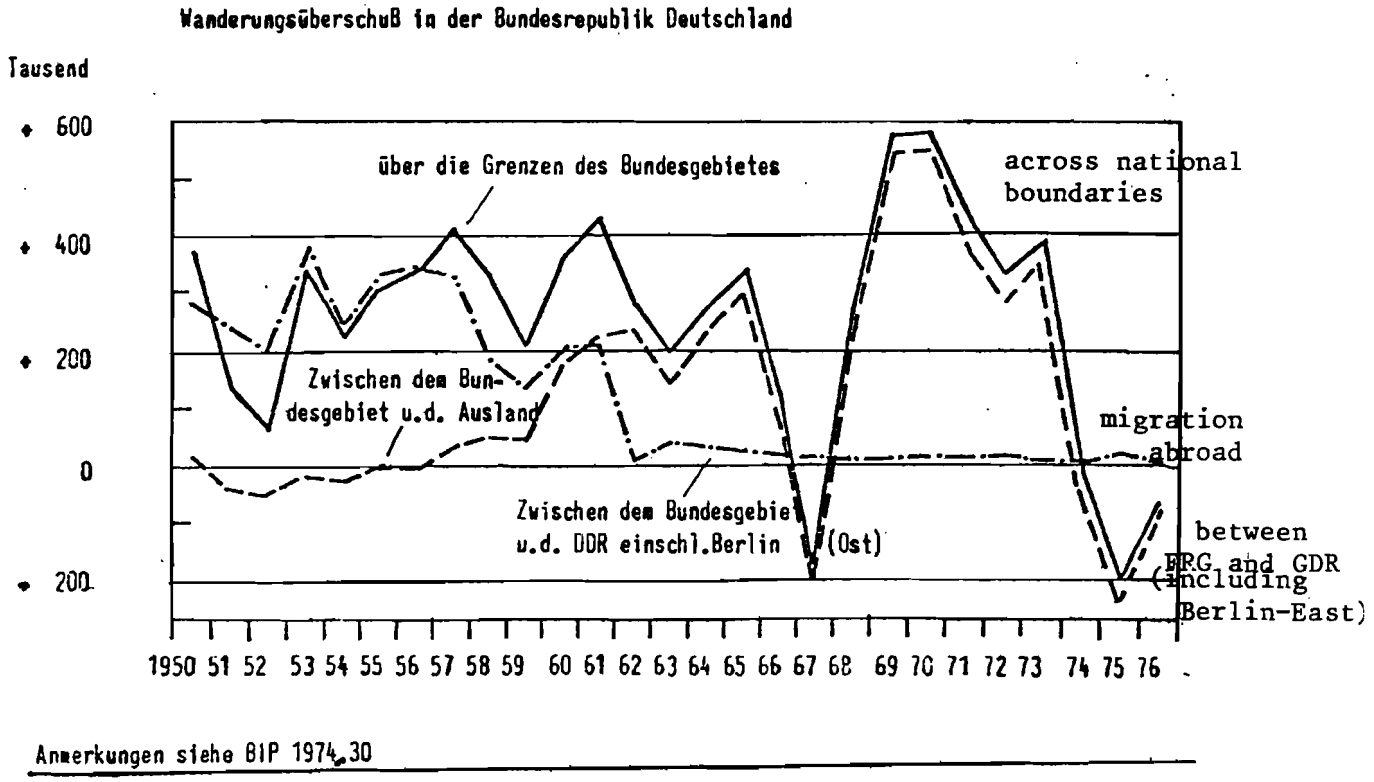
Since 1950 the number of deaths increased each year in the FRG. This development is a result of the existing age structure. The crude death rate remained relatively constant during that time, and was between 10,5 in 1950 and 12,2 in the years 1968 and 1969 when influenza epidemics occurred. In 1977 it was 11,5. Age-specific death rates have always been higher for the male population than for the female population.

There have been considerable changes in the death-probabilities between 1950 and 1975. This is specially true of the newborn and the one and two year old infants. Their mortality could be reduced by approx. 60 % because of more hospital births and legally established medical routine check-ups of infants and babies. Among women aged 20 to 30, who in previous years were subject to higher death probability because of childbearing, there has also been a 50 % decrease in death probability since 1950. Generally speaking, we observe a fall of death probability in all female age groups; however, the drop being smaller at higher age. Death probability among men over 60 has increased due to cardio-vascular diseases. An increase in male life expectancy occurred only for the newly born, the one and two year old and the men over 80 years (BIB, 1974, p.25).

1.2.3 Migrations across the border of the FRG

In the period 1950 to 1961, the migrations between the GDR and the FRG played a major role in external migrations. The migration gain from the GDR including Berlin (East) was almost 3,1 million people. After the closing of the borders between the Western and Eastern Sectors of Berlin by the GDR government in August of 1961, the migratory flow to Berlin (West) and from there on to the Federal Republic was interrupted. Since 1961 usually only those persons who have retired from the active labor force are permitted to emigrate to the FRG. Therefore, the age structure of the migrants from the GDR to the FRG has undergone a basic change. While from 1953 to 1959 the people aged over 65 only constituted 6 % of al migrants, after 1963 their percentage was 50.

Figure 1-2. Net migration in the FRG



The strong economic growth in the sixties and the lack of migrants from the GDR resulted in an increasing demand for labor force from beyond the borders of the FRG. At first, the gains through migration vis-à-vis the neighboring Netherlands and Austria as well as vis-à-vis the Common Market member Italy rose sharply. The recruitment of labor force occurred in the second half of the sixties under state control and with state support (Recruitment contracts). Because of recruitment contracts, in particular those with Yugoslavia and Turkey, the nationality-structure of foreign migrants was changed considerably. Between 1961 and 1974 the FRG saw a migration gain of more than 3 million people. With the exception of 1977, when a phase of economic recession caused a negative balance of immigration, the migratory gains were mostly above 300,000 persons per year. The discontinuation of recruitment of foreign labor issued by the Federal Government towards the end of 1973, first resulted in a strong decrease of foreign immigration in 1974.

The strong economic recession that began in 1974 had decisive effects on the employment of foreign labor and on immigration into the FRG. The immigration of some 870,000 foreigners in 1973 fell to about 540,000 in 1974, while at the same time the emigration of foreign nationals rose from 530,000 to 580,000. The emigration of foreigners continued in 1975, and reached its peak in the third quarter of 1975. The negative migratory balance in 1975 reached a total of 200,000. Emigration has continued throughout 1976, although in a somewhat modified form, the negative balance adds up to only 72,000 persons (Koch, 1977, p.875).

There has been a remarkable change in the structure of immigration from abroad as compared to previous years. In the early phases of guest-worker migration the group of young and single men was particularly high. Now, due to family-reunification, the groups of women, children and adolescents gain in importance. This may have resulted in a slightly positive migration balance in 1977. The group of single men constitutes still the largest group of emigrants.

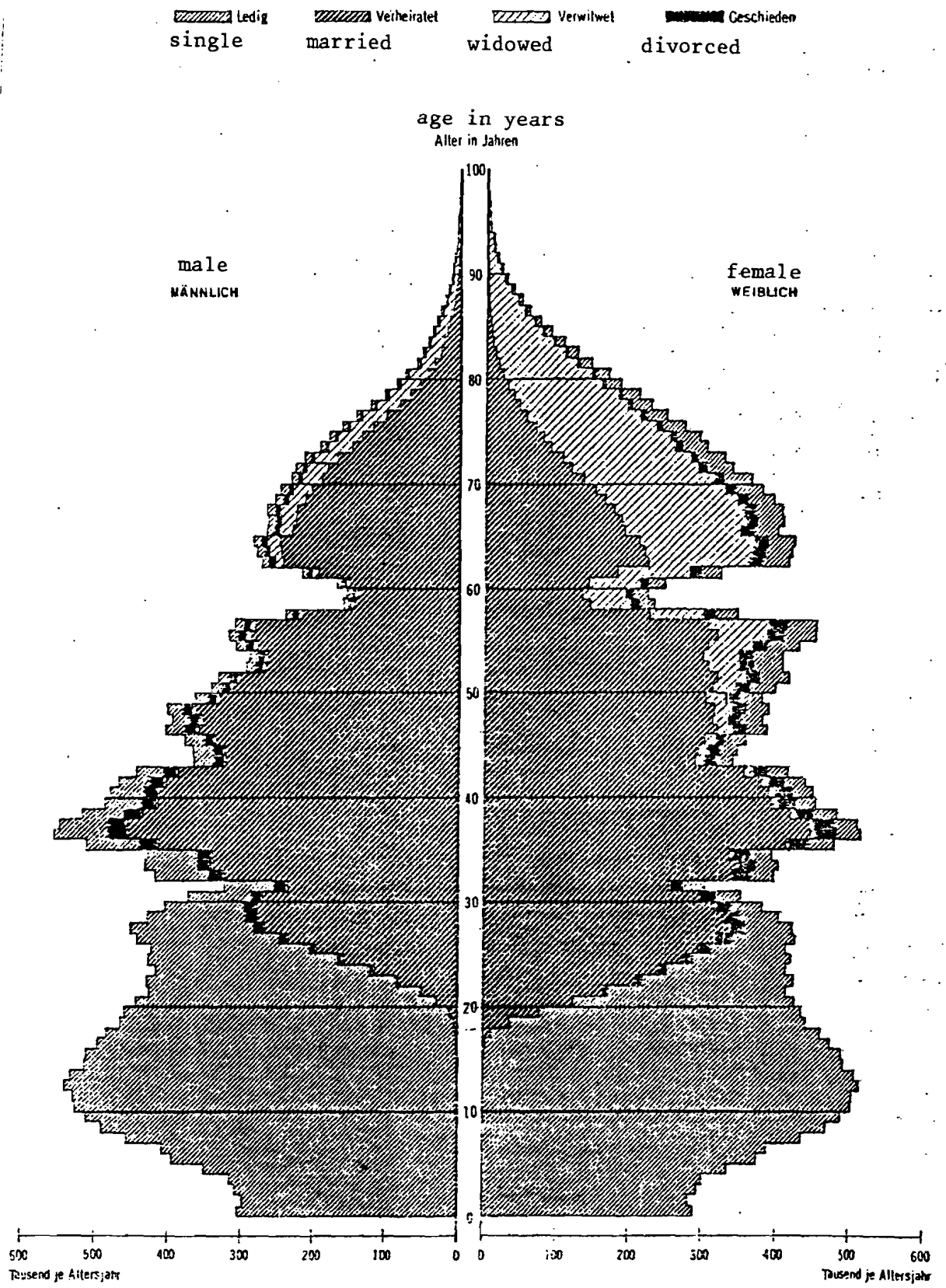
The gain through migration of 32,000 persons is set off against a population loss of 122,000. Under the assumption of constant conditions - the maintenance of migration restrictions and continuing lows employment rates - the impact of migration on population dynamics in the next years can be expected to be considerably less than in the early seventies.

1.2.4 The Age Structure of the Population

The age structure of the FRG's population is a result of natural change, losses due to the two world wars and migrations. In 1976 the most noticeable age structure variations occurred in the 25-29 year olds because of the shortages in births towards the end of the Second World War, and among the 55-59 year olds due to heavy losses of male persons during the war. Because of the World Wars' losses the proportion of the sexes is unequal: there are 1,100 females to 1,000 men in 1976.

Abb. 1-3: Altersaufbau und Familienstandsgliederung in der Bundesrepublik Deutschland (31. 12. 1976)

Figure 1-3. Age structure and marital status in the FRG (31.12.76)



Quelle: Statist. Bundesamt

The number of births increased stadily from the early fifties to the mid-sixties, and this is reflected in the 1976 age structure and the higher share of the 10-15 year olds. The reasons for this rise in births can be traced back to the higher share of 35-40 year olds in 1974. Since the mid-sixties the births have been declining, which can be seen by the low proportion of the youngest age groups.

Post-war migrations and the integration of foreign workers are of great importance for the age structure. Migrants account for up to 25 % of certain age groups. Without immigration the young and medium age groups would be far less numerous.

2. Trends in the Regional Population Dynamics

2.1. Regional Units of Analysis

Analysis of the population dynamics in the FRG carried out on the county level is unsatisfactory both from the point of view of the demographer and the federal regional and state planner: important regional trends are suppressed , when regions are grouped into counties. In spite of this, we carried out the multiregional population analysis on county level, since comprehensive migration data were obtainedable in a comparatively short time. To preventthe information losses through regional aggregation, the survey of regional demographic trends presented here is based on the concept of the so-called model regions (higher or upper centers with hinterland). We thus obtain 58 regions defined by functional criteria consisting of administrative local units (districts, Kreise) (Kroner, Kessler, 1976, p.15).

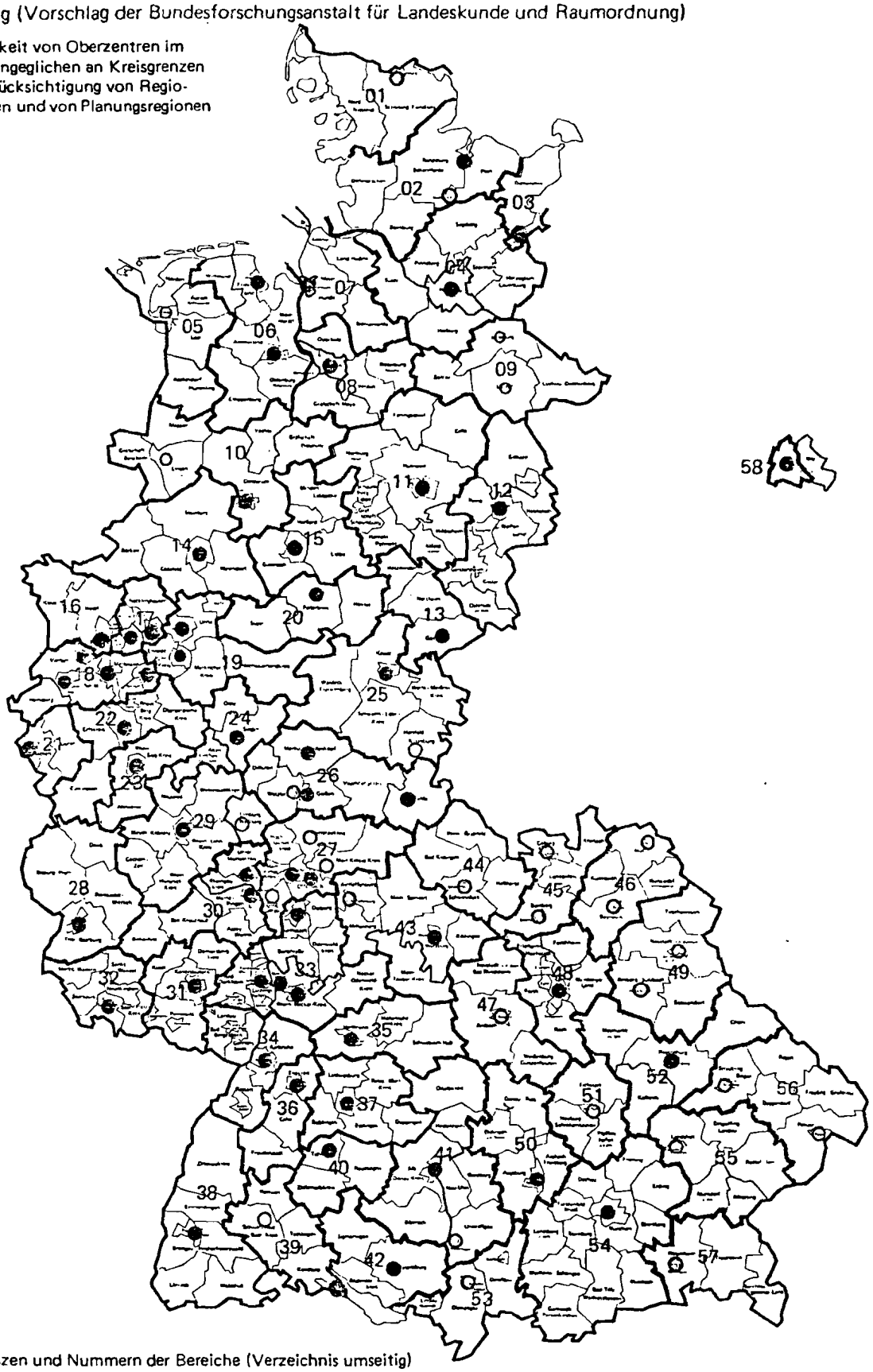
2.2 Trends of Population Dynamics in the Regions

In 1976, the population density of the upper-central hinterland regions was between 72,6 (inhab/sq.km) in the area of Lüneburg, and 1,726.7 (inhab./sq.km) in the area of Essen. The

Karte 2-1, Map 2-1. Hinterlands of higher centers.
Überarbeiteter Entwurf:

Bereichsgliederung (Vorschlag der Bundesforschungsanstalt für Landeskunde und Raumordnung)

nach der Erreichbarkeit von Oberzentren im Individualverkehr, angeglichen an Kreisgrenzen 1.1.1975, unter Berücksichtigung von Regionalen Arbeitsmärkten und von Planungsregionen der Länder



10 Grenzen und Nummern der Bereiche (Verzeichnis umseitig)

● Oberzentren

○ Zentrale Orte mit Teilfunktionen eines Oberzentrums (mögliche, noch nicht voll entwickelte Oberzentren)

● ○ Zusätzlich ausgewiesene (mögliche) Oberzentren

Quellen: Raumordnungsbericht 1974 (Karten C.2.1 und C.2.3); Bundesraumordnungsprogramm (Karte S. 14); ROLAND-Projekt, DATUM e.V.; Klemmer 1975

Entwurf: BfLR – F 8 – Juli 1976

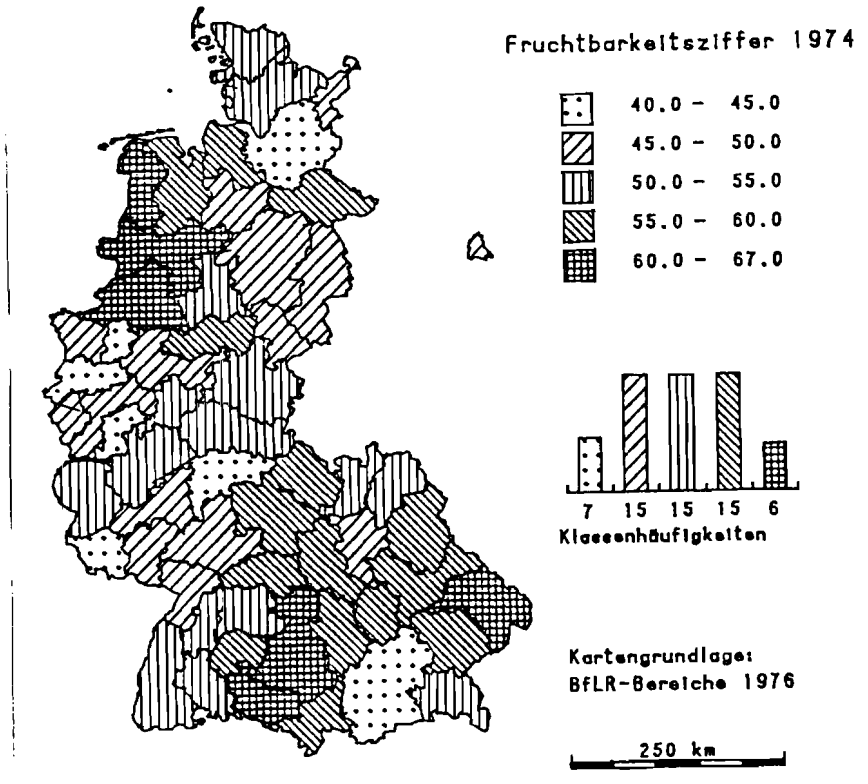
Grundkarte: Kreisgrenzen 1.1.1975, Maßstab 1 : 4 000 000

Essen area belongs to the so-called densely populated areas (Verdichtungsgebiete), in which the population density is at least 506,9 (inhab./sq.km). In the rural areas the average population density was 114,2 (inhab./sq.km). On the county level the density of population ranged from 507 to 154 (including the counties of Bremen and Hamburg).

2.2.1 Natural Growth

Urban and rural areas are also suitable to serve as categories of observation for regional population dynamics. In 1976 the crude birth rate in urban areas was 9,3 per thousand and significantly below that of rural areas (10,6 ‰). In 1976, as in the preceding years, the highest birth rates were observed in the rural areas of north-west Germany (Emden 12,5) and east Bavaria as well as southern Baden-Württemberg. The lowest figures were found in the agglomerations of Hamburg and Munich (8,7), despite the fact that the proportion of women in child-bearing age was highest in the urban areas. This proves that, in the FRG, fertility in rural areas is considerably above that of urban places.

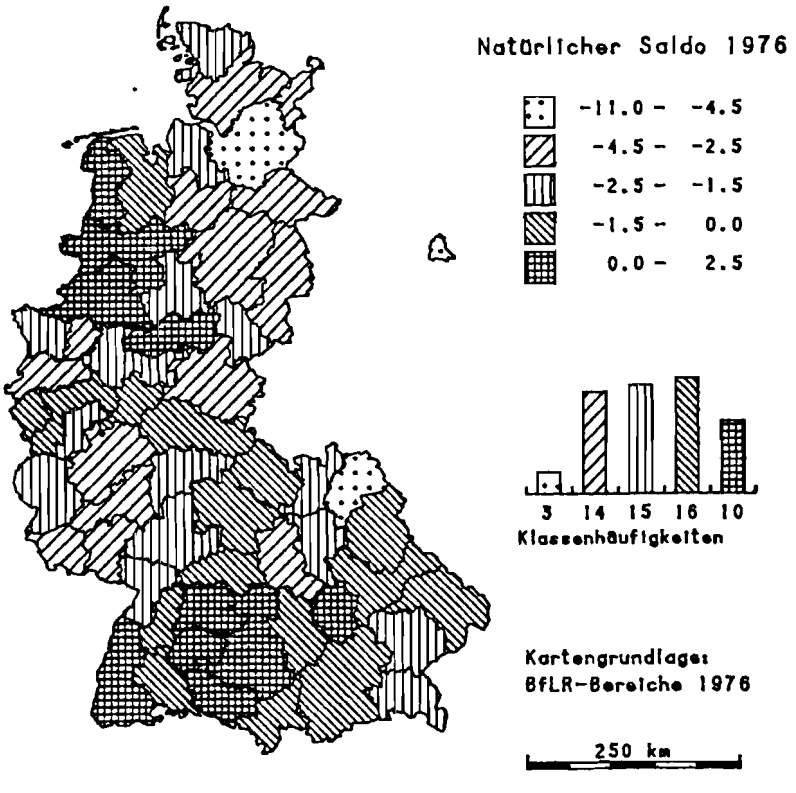
Map 2-2. Fertility rates 1974.



The general fertility rate ranged from 66,9 in the Emden area to 40,7 in the Munich area in 1974. A net-reproduction rate of more than 1,0 was reached in a few regions only in 1974. These regions, taken together, only have a German population of 2,5 million (Schwarz,1977, p.387).

The crude death rate is about equal in urban and in rural areas. It markedly depends on the specific regional age structure. In the rural areas of Schleswig-Holstein and Oberfranken the crude death rate was especially high in 1976 (14,3), but in several urban areas such as Hamburg and Düsseldorf such high rates are also found (13,2). All of these regions have in common a high proportion of the over 65 age group.

Map 2-3. Net natural growth 1976.



In 1976 the natural population change was positive only in eight districts, and the highest natural growth rate was found in the Emden area (2,1 per thousand). In 1970, 50 districts had a positive balance of the natural population movements; at that time the natural growth rate in the Emden area was still 8,2 per thousand.

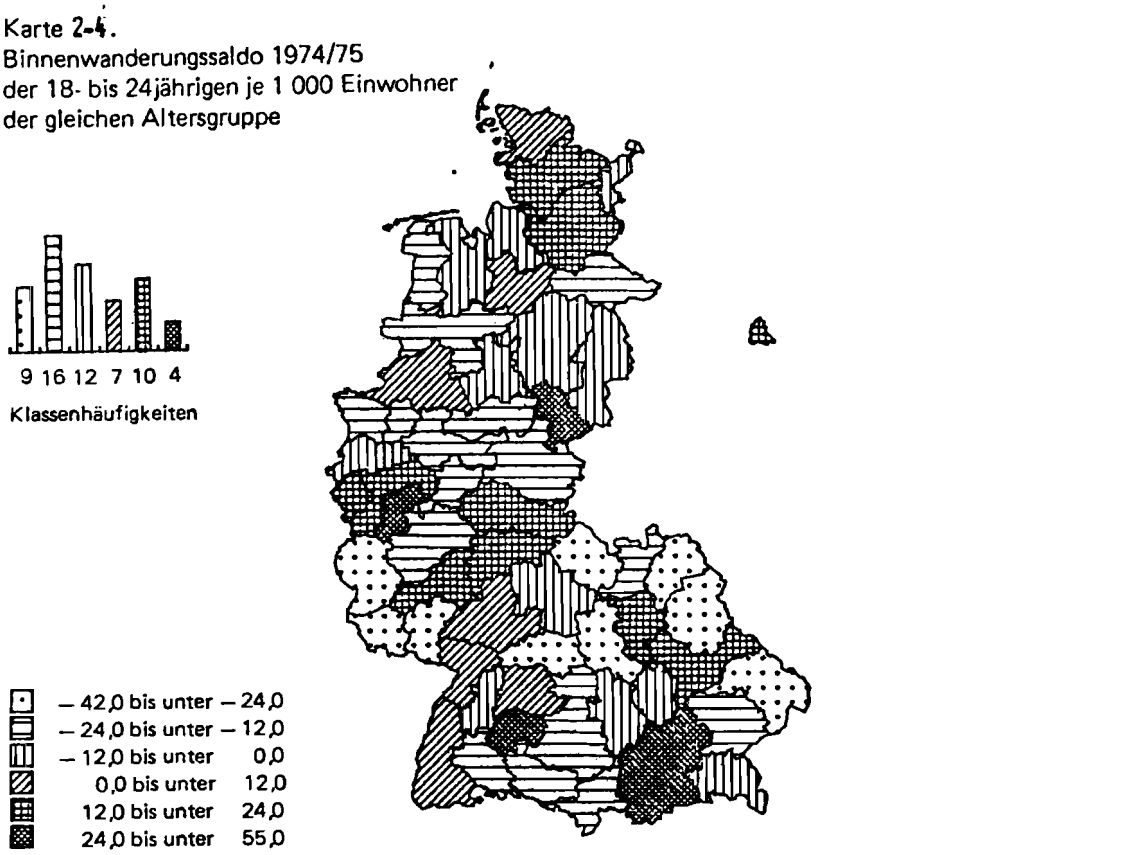
The radical decline of births led to a negative balance in the natural population development in almost all regions within a relatively short time. The decline is particularly heavy in the urban areas. If this decrease in births continues, then any recruiting of people for the urban areas will cause a loss in population to the rural areas.

2.2.2 Interregional Migration

During the past years, the spatial distribution of population was mainly influenced by migration. There were particularly high migration gains in the sixties and the beginning of the seventies in the large urban areas of Hamburg, Düsseldorf, Cologne-Bonn, Rhein-Main, Rhein-Neckar, Stuttgart, and Munich, while almost all sparsely populated rural areas and industrial problem regions suffered migration losses. These were highest in Emsland, the Ruhrgebiet, in the Eifel, in Saarland, Oberfranken, and east Bavaria. During that time it could be seen that internal migration was less dependent on economic cycles than international, and was caused mainly by regional disparities.

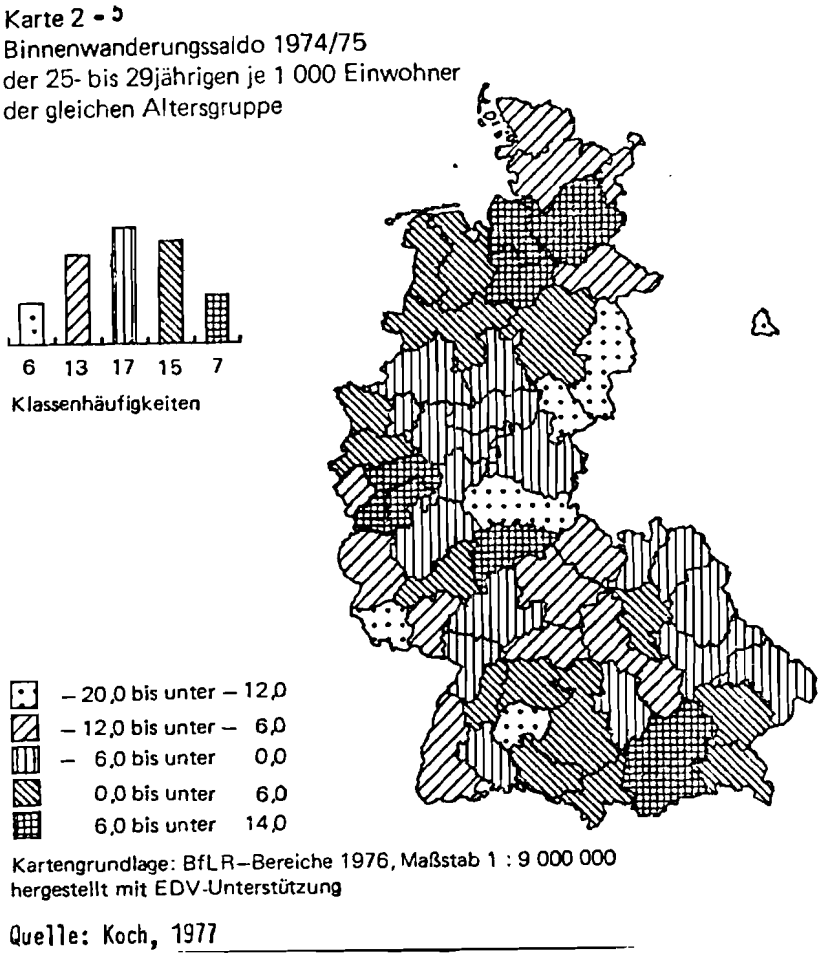
The regional distribution of gains and losses through internal migration remained largely constant during the economic crisis of 1974/75. The areas of out-migration (rural areas and industrial problem regions) are still compensated for by attractive agglomerations having large gains through internal migration. This attractiveness has, however, slightly shrunk since the sixties. Only the areas of Bonn and Munich were able to experience exceptional gains through migration. In the total view, the concentration of internal migration gains along the heavily agglomerated axis of Hamburg-Ruhrgebiet-Rhein-Main District-Stuttgart-Munich was, in 1974, somewhat weaker than in previous years (Koch, 1977, p.879).

Map 2-4. Net internal migration 1974/1975 of 18-25 year old population.



The 18-24 year old and the 25-29 year old age groups have still a predominant migration flow toward urban areas. In the age group 18-24 the migration towards university towns plays an important role, and explains the high migration gains of the areas of Bonn, Göttingen, Tübingen, and Munich. Not all regions that have universities, do, however, have enough qualified employment opportunities. Therefore, in some university regions, such as Berlin, Giessen, Tübingen, and Freiburg, heavy out-migration of the 25-29 year olds can be observed. Migration gains in this age group are found in the above mentioned agglomerations, but also - and this is a new element as compared to previous years - in parts of the Ruhrgebiet and in all the areas of north-western Germany.

Map 2-5. Net internal migration 1974/1975 of 25-29 year old population.

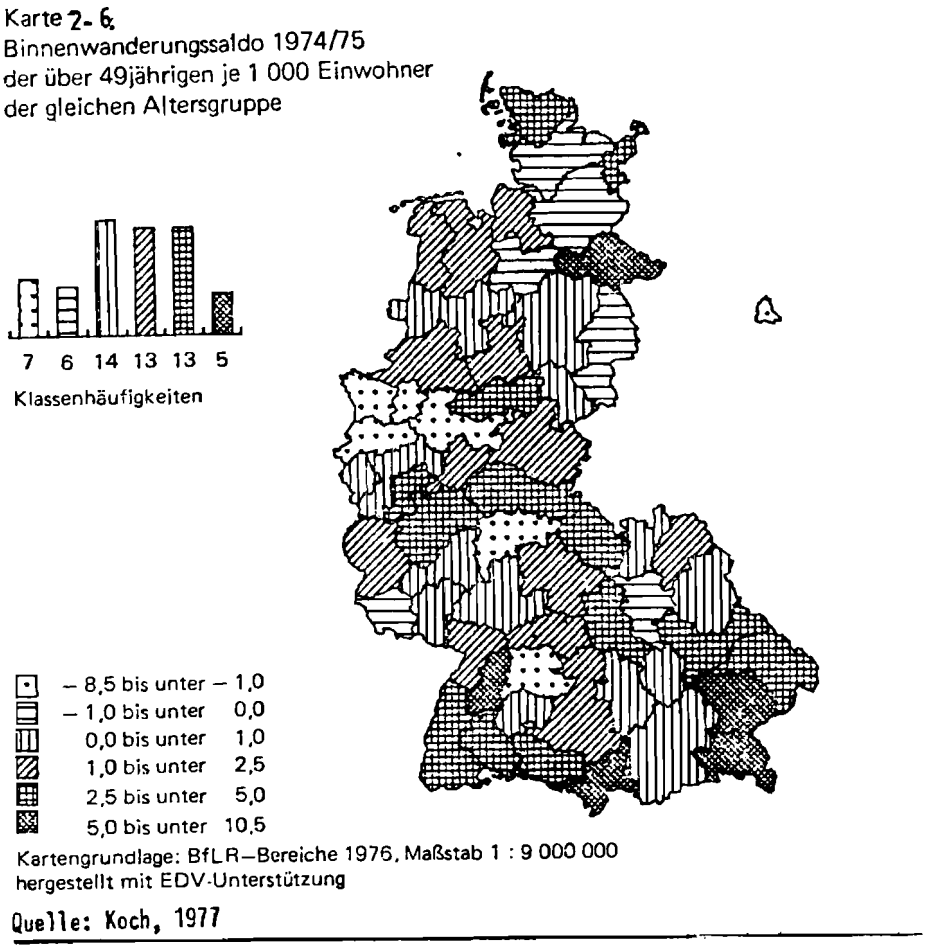


Internal migration of the age groups over 49 remained relatively independent of economic trends in 1974/75. This age group migrates mostly from urban areas having environmental pollution. This applies most strongly to Berlin, followed by the Ruhrgebiet and the area of Stuttgart. Areas of scenic attraction along the coast, in the Mittelgebirge (Middle Range) and in the Alpenvorland therefore have migration gains (Koch, 1976).

The spatial distribution of migration balances stemming from the internal migration of foreigners shows a peculiarity, inasmuch as all those areas with positive balances also experience heavy out-migration of foreigners abroad. Presumably many foreigners in rural areas expect better job opportunities in the urban areas inspite of the tight labor market situation there. All people in the labor force, as a matter of fact, hope for

better working conditions and income in regions with centers of transregional importance; such as Hamburg-Bremen, Düsseldorf-Cologne-Bonn, Frankfort-Wiesbaden-Mainz, Stuttgart, Nuremberg, and Munich. The attractiveness of Hamburg and Munich reaches far into their neighboring regions.

Map 2-6. Net internal migration 1974/1975 of population above 49 years.



On the other hand, a decrease of out-migration from some weakly structured rural districts can be observed. It is hardly imaginable that this decrease is caused by an improvement of living and working conditions there. Rather, we may assume that the employment opportunities in urban areas for unskilled labor have deteriorated sufficiently in 1974 and 1975, to deter migration to these destinations. Possibly unemployment is accepted in the home districts, at least by older people, where their social contacts and

some side-employment may bring additional security besides the employment subsidy.

Out-migration from traditional areas of out-migration and in-migration into the attractive agglomerations has slowed down somewhat, it is true; but it would be highly exaggerated to speak of a reverse in migration trends, as has been observed in the USA or in Denmark.

2.2.3 Intraregional Migration

When discussing intraregional migration we are immediately faced with the problems of urban-hinterland migration in the urban areas. Intraregional migration in rural areas has so far been completely neglected in migration research and in political discussions (Koch, 1977, p.884).

The emphasis on urban-hinterland migration can be traced back to the general decline of population in the agglomerations since the early seventies. The core cities of the urban areas are losing inhabitants to the hinterland and to distant areas (migration into other agglomerations, retirement-migration). Migration loss cannot be compensated for any more by migration gains vis-à-vis parts of rural areas. The negative migration balance of Germans was hidden in some urban areas by migration gains through foreigners.

The peripheral municipalities experienced a large increase in their population through migration gains as compared with the central city and the core area. Two migration flows thus met in the suburban area: a direct and an indirect peripheral migration. It is mostly the migration of qualified employees that originate in and also have as destinations the suburban areas. Because of a shortage of building area reserves and the rising prices of land the urban-hinterland migration tends to expand over greater distances.

These migration processes lead to social segregation in the urban areas. Households with medium and upper income, moving out, are replaced only by households with low income, if at all. In

Table 2-1. City-hinterland migration 1967-1975

Tab. 2-1:

Stadt-Umland-Wanderung(*) ausgewählter Städte 1967–1975

Net migration (anolute)

Wanderungssaldo (absolut)

	1967	1968	1969	1970	1971	1972	1973	1974	1975
Frankfurt-Offenbach	– 11 264	– 9 952	– 10 817	– 11 534	– 14 838	– 13 760	– 12 901	– 8 792	– 7 923
Hamburg	– 12 023	– 11 959	– 12 656	– 12 787	– 16 468	– 16 187	– 15 928	– 11 907	– 8 634
München	– 4 385	– 3 639	– 4 872	– 10 398	– 13 803	– 17 987	– 17 060	– 9 261	– 4 653
Köln	– 4 715	– 5 045	– 5 263	– 6 483	– 6 501	– 7 134	– 8 051	– 7 055	– 3 332
Emden	+ 142	– 46	– 87	– 51	+ 313	–	+ 137	+ 38	– 145
Schweinfurt	+ 59	– 35	– 234	– 223	– 177	–	– 315	+ 174	– 192

Net migration per 1000 population

Wanderungssaldo auf 1 000 Einwohner

Frankfurt–Offenbach	– 14,4	– 12,8	– 13,8	– 14,7	– 19,1	– 17,5	– 16,5	– 11,4	– 10,5
Hamburg	– 6,6	– 6,6	– 7,0	– 7,1	– 9,2	– 9,2	– 9,1	– 6,9	– 5,0
München	– 3,5	– 2,8	– 3,7	– 7,9	– 10,3	– 13,4	– 12,8	– 7,0	– 3,5
Köln	– 5,5	– 5,9	– 6,1	– 7,6	– 7,7	– 8,5	– 9,7	– 8,5	– 3,3
Emden	+ 3,0	– 1,0	– 1,8	– 1,0	+ 6,3	–	+ 2,6	+ 0,7	– 2,7
Schweinfurt	+ 1,0	– 0,6	– 3,9	– 3,8	– 3,1	–	– 5,5	+ 3.1	– 3,4

(*) Umland: Kreise im gleichen BfLR-Bereich
Ausnahmen: München – Oberbayern
Köln – Erftkreis und Rheinisch-Bergischer Kreis

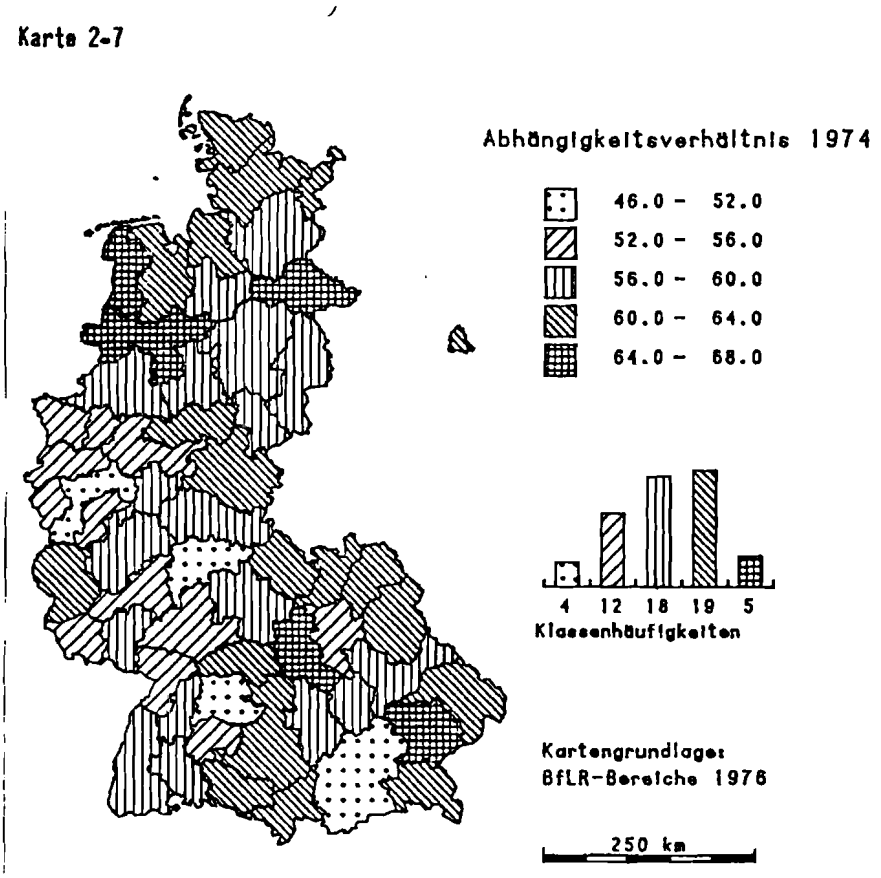
Quelle: Koch, 1977

most cases the process of urban-hinterland migration is associated with a large share of older people of the German population in the core town, and an increase of children in the hinterland.

2.2.4 Regional Age Structure

Persons in active ages are overrepresented in urban areas; younger and older age groups, again, are overrepresented in peripheral rural areas. Thus, in the agglomeration of Munich there were only 46 persons not in the labor force to 100 persons in the labor force in 1974. In the rural area of Emden, this proportion is 61 to 100. Regional peculiarities can be found in those areas where persons of one predominant age group (refugees) settled after the Second World War. This explains, for instance, the high

Map 2-7. Dependency ratios 1974.



proportions of the over 64 year old in Schleswig-Holstein and in eastern Niedersachsen. In areas with high birth rates, the age group of the under 15 year olds is significantly larger, while in areas that have seen migration losses of labor force age groups, and simultanous migration gains of retired people, we find a high proportion of old people (Koch, 1976, p.4.07).

The population's age structure also varies within the regions. This is particularly noticeable within the urban areas. In the centers of these agglomerations young and single persons as well as old people are over-representated, while many moreyoung couples with children live in the peripheral zones.

2.3 Population Dynamics in the Counties

The year 1974 is taken as the basis year for describing the trends in population development in the counties and for our multiregional population analysis. The trends described above are reflected in the population development of the individual counties, depending on how strongly each type of region is represented in the counties. E.g., the counties of Hamburg and Bremen are cities just like Munich and Frankfort, and their problems, resulting from population dynamics, are therefore very similar. This must be taken into account when comparing the urban counties and the other eight counties which are composed of zones of varying structures.

Counties with regions having high birth frequency, in 1974 also registered high crude birth rates. In Baden-Württemberg, for instance, the high birth rate was reached because of a large proportion of foreign births (24 %).

There is only a slight variation in age-specific fertility rates among counties. A low fertility level and advanced average age of the mother at birth is typical for the urban counties. As age-specific fertility rates vary only slightly, the age structure plays an essential role in the spatial variation of birth figures.

As the crude death rate is similar in all counties except the urban counties (around 12 per thousand), natural population growth is effected mainly by differing birth rates. With the exception of Baden-Württemberg all counties experienced an excess of deaths, the loss being greatest in Saarland.

The emigration of foreigners associated with the recession that started in 1977 had considerable regional differences. The migration loss in absolute and relative terms was highest in Baden-Württemberg, because Baden-Württemberg, after Nordrhein-Westphalia had the second highest share of foreigners (22 %). As opposed to Baden-Württemberg, Nordrhein-Westphalia experienced a migration gain in 1974. The explanation for this may be sectoral differences in the recession impact.

Abbildung 2 -1: Figure 2-1. Age-specific fertility rates 1974 in the FRG and in some counties.

Altersspezifische Fruchtbarkeit 1974 in der Bundesrepublik Deutschland und ausgewählten Bundesländern

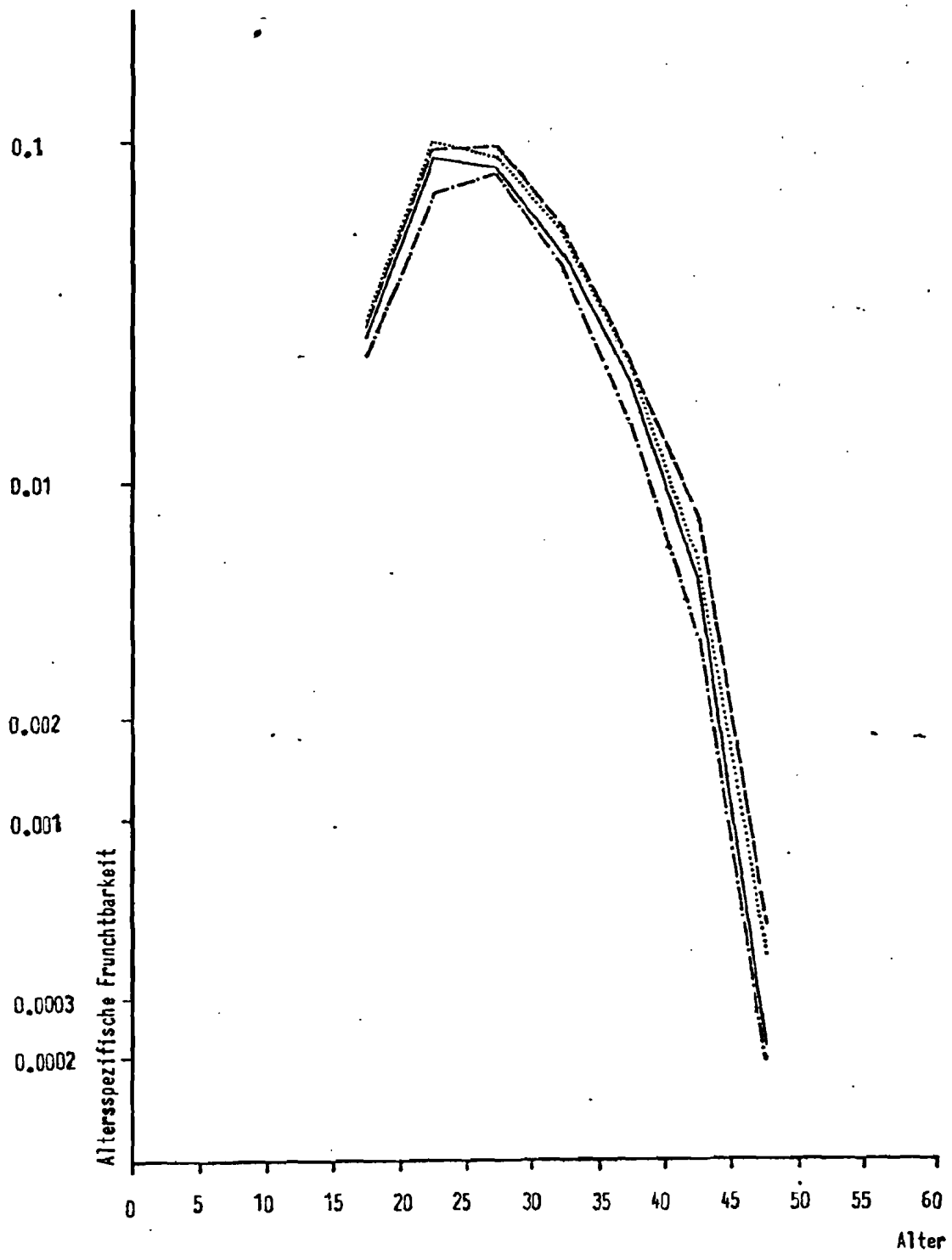


Abbildung 2 - 2 Figure 2-2. Age-specific mortality rates in FRG.

Altersspezifische Sterblichkeit 1974 in der Bundesrepublik Deutschland

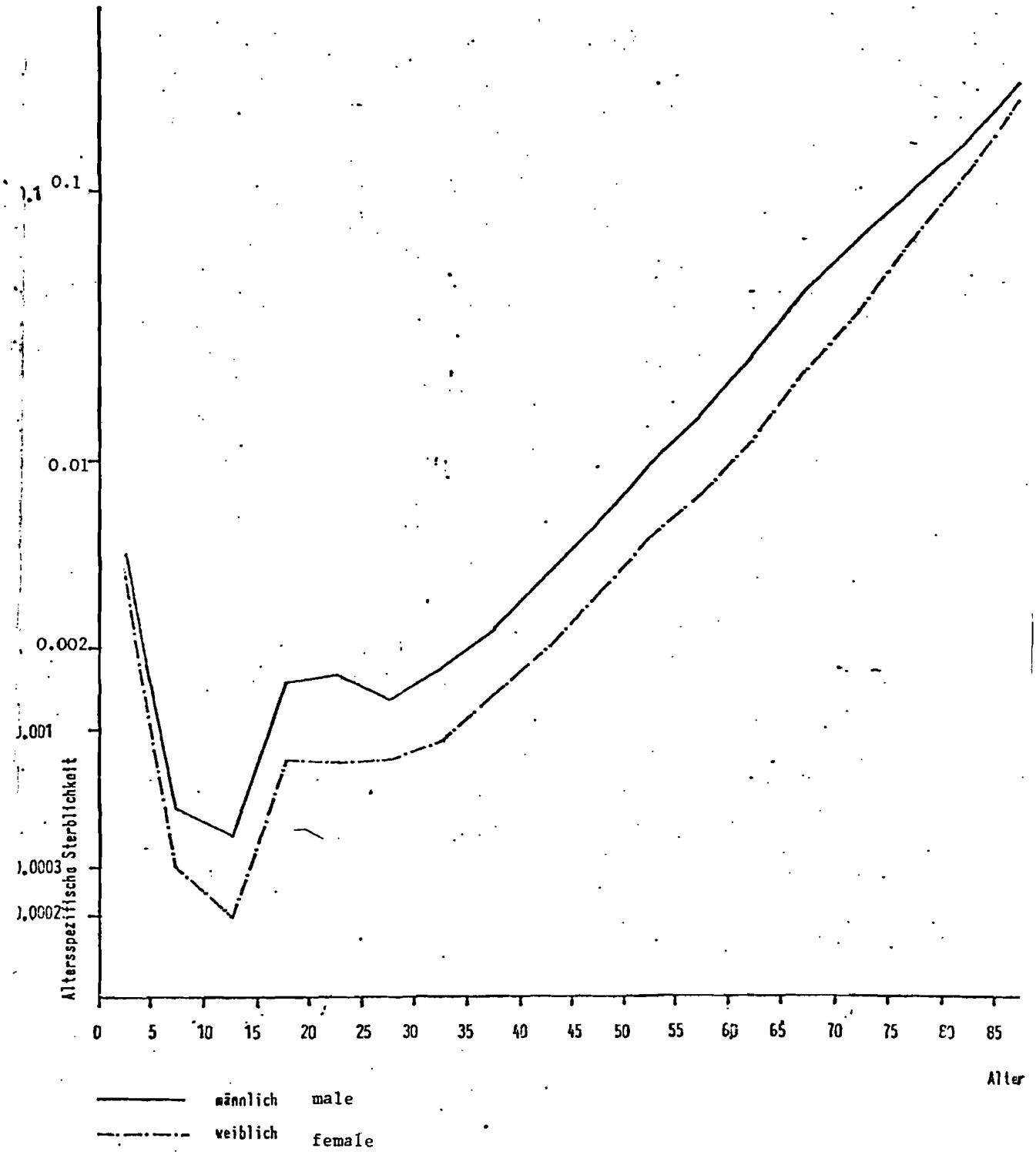


Table 2-2. Net inter-county migration in 1000 (1974).

Tab. 2-2: Salden aus den Wanderungen zwischen Teilräumen des Bundesgebietes 1974 in 1000

Origin Herkunftsgebiet		Zielgebiet (Destination) Nord North	Mitte Central	Süd South
Nord	North	X	-6	+2
Mitte	Central	+6	X	+14
Süd	South	-2	-14	X
Insgesamt	Total	+4	-20	+16

One of the dominant characteristics of internal migration between counties after 1961, was a clear migration flow from Niedersachsen to Hessen, Baden-Württemberg, and Bavaria. If the counties are combined into three groups (north, central, south), then the southern counties, Baden-Württemberg and Bavaria gain continuously in population through migration from the northern and central counties. The northern counties also showed a positive migration balance in 1974. The central counties experience migration losses. Between 1970 and 1974, Nordrhein-Westphalia lost some 81,000 persons through migration to other counties. The largest gains occurred in Bavaria (100,000 people between 1970 and 1974).

Regional out-migration rates vary predominantly in the age groups between 15 and 30 years. There is hardly any propensity to migrate during these age groups among those living in the urban counties, where a full variety of educational and training opportunities is offered. The propensity to migrate is much greater in counties with a large share of structurally weak regions; a large portion of the young migrate to another county when looking for qualified training or job opportunities. The high out-migration rates (internal migration) observed in Baden-Württemberg, which has an overall positive migratory balance, point to relatively high fluctuations.

Abbildung 2 - 3:

Wanderungsraten 1974 in der Bundesrepublik Deutschland und ausgewählten Bundesländern

Figure 2-3. Migration rates 1974 in FRG and in some counties.

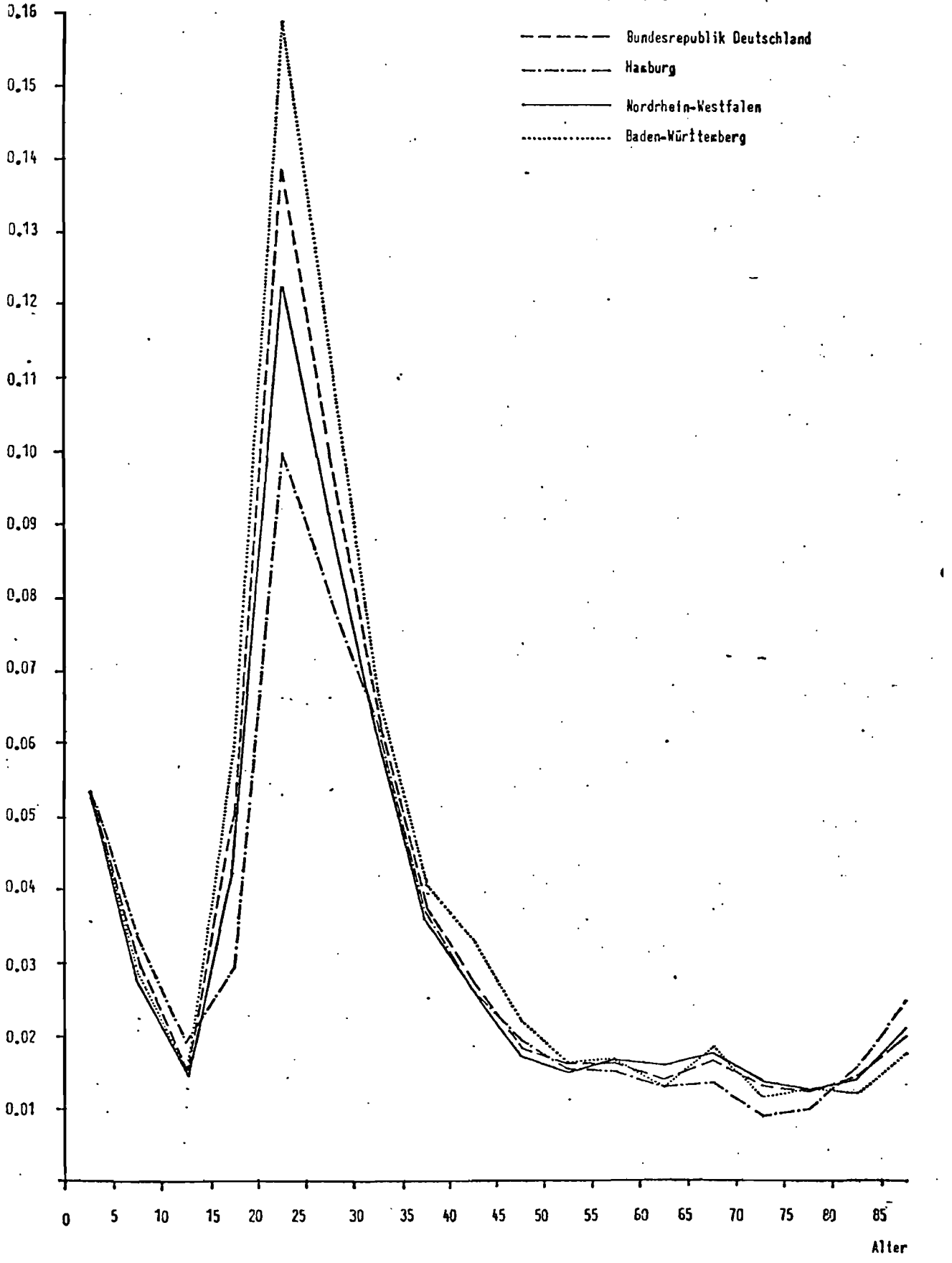


Abbildung 2 - 4 Figure 2-4. Age structure 1974 of FRG and in some counties.

Altersstruktur 1974 in der Bundesrepublik Deutschland und ausgewählten Bundesländern

Intercounty variation in the age structure of the population is small, although the more industrialized counties have a larger proportion of population in active age groups , as compared to counties with mostly rural areas. In Baden-Württemberg and in Nordrhein-Westphalia the active population is complemented by foreigners. Urban counties are characterized by a high share of population over 65 years of age.

3. Multiregional Population Analysis

3.1 Preparation of the data

The preparation of the data on population and natural change caused no major problems, since previously prepared computer data could be used.

The basic population was taken from the population census of Dec. 31, 1974, and was divided into 5 year age groups. For each county, the age stratification was available only up to the 65 year. The 65 year and over age group in the individual counties was disaggregated into 5 year age groups (65-69, 70-74, 75-79, 80-84, 85+), in accordance with the age structure of the national population.

The number of life births by age of mother was also taken from the population census of 1974. Because of errors in the crude data the values for Niedersachsen county had to be estimated.

No figures for deaths by age groups were available on computer data for the single counties or the Federal Republic. Therefore, this variable was estimated by means of average age-specific death rates for the years 1970/71. These age-specific death rates were not available by county. Hence the number of deaths in the counties varied only on the basis of the differing age composition (as a consequence, the life expectancy at birth is identical for all counties, up to rounding errors).

The tables of migration flows produced by the Statistical County Offices on district level were used as basic material for the migration interaction between the counties. They were aggregated by sex on the county level. The age groups of the basic material did not meet the requirements of the multiregional population analysis model. The number of migrants, by 5-year age groups were obtained by aggregating the number of migrants by single year of age. The aggregation was based on the year of birth.

The input data for the multiregional population analysis were examined by means of "population characteristics" made available by IIASA, and compared to publications of the public statistical records. The only deviations worth mentioning occurred in the total death figures, which on the basis of age-specific death rates of 1970/71 exceeded the observed number by about 10,000. The difference in births was only 0,2 % and most likely caused by an error in the estimation of Niedersachsen county.

3.2. Multiregional Life Table

Life tables are the oldest models in demographic analysis. They answer the questions: how would the present mortality affect the survival behavior of a hypothetical cohort ? Or, expressed differently: how would a hypothetical generation diminish if it was subject to the actual age-specific mortality. Such life tables, obtained on the basis of the mortality of a given period, predict the survival patterns and average life-expectancy of one individual, using actual current mortality and presuming it to remain constant in the future.

The model of 'multiregional life tables', in addition, includes the demographic phenomenon of *migration*. Besides observed mortality patterns, migration patterns are applied to a cohort of people, and the question is raised: how would a hypothetical generation of a given region diminish, due to mortality and out-migration, assuming it were subject to actual age-specific mortality and out-migration probabilities (Willekens and Rogers, 1976).

The model of conventional life tables is thus complemented by migration and gives a "model of multiregional life tables" offering detailed and more realistic information. "Multiregional life tables" provide an excellent tool for comparing mortality and migration patterns of various populations.

The following applications are of particular interest:

a) life expectancy;
b) survival probability;
c) number of persons remaining in any one region at a specific age.

These three forms of application will be dealt with in detail using the results of IIASA's modeling and data processing.

The point of departure for the construction of multiregional life tables are age-specific death and out-migration probabilities. It must be noted, however, that due to the basic data given, regional variations in death probabilities between the counties can be explained only by different age structures in the counties. Thus there are only slight regional differences in mortality, e.g. the figures for the 20-24 year old age group ranges from 0,00548 (Berlin) to 0,00566 (Schleswig-Holstein), a difference of only 0,0002.

On the other hand, the figures for migration probabilities for the 20-24 year old age group range from 0,51 (Bremen) to 0,15 (Bavaria), i.e., the probability of a 20-24 year old from Bremen migrating to another county is three times as high as the probability of a 20-24 year old from Bavaria migrating.

These differences can be attributed primarily to the varying size and structure in the counties. There are about 725,000 inhabitants in Bremen, and about 10,850,000 in Bavaria. The opportunity for training and jobs for a 20-24 year old is much larger in Bavaria than in Bremen, which explains why the necessity of a 20-24 year old living in Bavaria for migrating to another county is much lower than for a 20-24 year old living in the urban county of Bremen.

A comprehensive index of the life path of a birth-cohort (0-1 year old) is given by the life expectancy Table 3.1. The last column of Table 3.1 gives the total life expectancy of a person, born in a specific county. Because of the basic data the figures of the counties do not vary, as mentioned before. Therefore, only the values of the other columns are of interest.

First, we may ask how many years out of a lifetime are spent in the individual county of birth. Someone born in Bremen, for instance, is likely to spend only 19 years of his 72 year lifetime in Bremen, while someone born in Bavaria, is likely to spend some two thirds or 50 years of his lifetime there. A person born in Bremen will most probably spend 23 years of his remaining lifetime (51 years) in Niedersachsen, but only 4 years in Bavaria. Someone born in Bavaria, on the other hand, is expected to spend 22 years of his lifetime outside Bavaria, 7 of those years in Baden-Württemberg, and a low of 0.2 years in Bremen.

Not only the life expectancy at birth, but also the life expectancy at each age is of great informative value. This is shown for 20-24 year olds (see Table 3.2). Members of this age group generally have an average life expectancy of 54 years. A person, born in Nordrhein-Westphalia (NRW) and living at age 20, will probably spend 33 years out of these 54 years in NRW, 5 years in Niedersachsen, 4 years in Bavaria, etc. A person, born in Niedersachsen will, however, spend only 24 years in Niedersachsen, but 20 years in NRW, 4 years in Bavaria etc.

Another life table statistic that is of interest is the survivorship proportion. Survivorship proportions denote the proportion of the life table population in age group x to x+4 in a given region (i) that will survive and be in another region (j) 5 years later. There are considerable variations between counties. The proportion of 20-24 year old people living in Hamburg that will survive is 0.99485. About 63.06 % will still be in Hamburg at that time, and 3.79 % will be in NRW (Table 3.3).

Table 3.1

Tabelle 3-1 Expectation of life at birth by region of residence and region of birth; Both sexes

	Region of Residence											Years
Region of birth	1	2	3	4	5	6	7	8	9	10	11	Total
1 Schl.-Holstein	33.1	6.2	9.0	0.9	8.6	2.9	1.4	3.9	4.2	0.3	1.4	71.9
2 Hamburg	13.1	23.9	12.3	1.0	8.1	3.0	1.3	3.7	4.2	0.2	1.3	72.0
3 Niedersachsen	3.2	2.2	40.2	1.7	10.8	3.2	1.4	3.7	3.8	0.2	1.4	71.9
4 Bremen	3.8	2.1	22.6	19.5	9.7	3.3	1.4	3.9	4.0	0.2	1.4	71.9
5 NRW	1.5	0.8	5.0	0.4	49.7	3.2	2.3	3.8	3.9	0.3	1.0	72.0
6 Hessen	1.3	0.8	4.0	0.4	8.8	38.5	3.6	6.5	6.6	0.5	1.1	71.9
7 Rheinl.-Pfalz	1.1	0.6	3.1	0.3	11.5	6.9	32.5	7.8	5.4	1.8	0.9	71.9
8 Baden-Württ.	1.1	0.6	2.8	0.3	6.2	4.0	2.7	44.0	8.8	0.5	1.0	72.0
9 Bayern	0.9	0.5	2.3	0.2	5.2	3.2	1.5	7.0	50.0	0.3	0.9	72.0
10 Saarland	1.1	0.5	2.4	0.2	7.9	4.6	7.8	7.3	5.0	34.4	0.9	71.9
11 Berlin (West)	2.8	1.4	7.5	0.6	9.8	4.3	1.9	5.8	7.2	0.4	30.2	72.0

Table 3.2

Tabelle 3-2 Expectation of life, age 20 by region of residence and region of birth; Both sexes

	Region of Residence											Years
Region of birth	1	2	3	4	5	6	7	8	9	10	11	Total
1 Schl.-Holstein	17.2	5.4	8.5	0.8	8.3	2.8	1.4	3.8	4.1	0.3	1.3	53.9
2 Hamburg	10.7	10.5	10.8	0.9	7.8	2.9	1.2	3.6	4.1	0.2	1.3	53.9
3 Niedersachsen	3.1	2.0	23.6	1.5	10.3	3.1	1.4	3.6	3.8	0.2	1.3	53.9
4 Bremen	3.6	2.0	18.7	6.5	9.4	3.2	1.4	3.8	3.9	0.2	1.3	53.9
5 NRW	1.4	0.8	4.7	0.4	32.6	3.1	2.2	3.7	3.8	0.3	0.9	53.9
6 Hessen	1.3	0.7	3.8	0.4	8.4	22.2	3.3	6.1	6.3	0.5	1.0	53.9
7 Rheinl.-Pfalz	1.1	0.6	3.0	0.3	10.9	6.4	16.5	7.4	5.2	1.6	0.9	53.9
8 Baden-Württ.	1.0	0.6	2.7	0.3	6.0	3.8	2.6	27.1	8.4	0.5	0.9	53.9
9 Bayern	0.9	0.5	2.3	0.2	5.1	3.1	1.4	6.6	32.7	0.3	0.8	53.9
10 Saarland	1.1	0.5	2.4	0.2	7.7	4.4	7.0	7.0	4.9	17.8	0.8	53.9
11 Berlin (West)	2.5	1.4	6.8	0.6	9.2	4.0	1.8	5.4	6.7	0.4	15.2	54.0

The survivorship proportion of a 20-24 year old in NRW is the same as in Hamburg, namely, 0.99486. The proportion that remains in NRW is, however, 0.86099, i.e. 86 % of all people living in NRW and 20-24 year old will still be there 5 years later. The proportion of 20-24 year old people residing in NRW that will move to Hamburg is only 0.00503 (Table 3.4).

The application of life table statistics can be illustrated in the following example: in educational planning the question may arise concerning the number of babies born that will become available for school enrollment in six years. This is answered by the *expected number of persons reaching a specific age x*. Thus, only 75,254 persons out of 100,000 born in Hamburg will reach age 5 in Hamburg (Table 3.5). In contrast, 92,000 out of 100,000 born in NRW will reach the age of 5 in NRW (Table 3.6). 1,774 out of 100,000 born in Hamburg will reach the 5-9 age group in NRW, but only 132 out of 100,000 born in NRW will reach the age of 5 and over in Hamburg.

Tab. 3-3 REGION HAMBURG

SURVIVORSHIP PROPORTIONS

Age	Total	Schl.-Holstein	Hamburg	Ni.-Sachsen	Bremen	NRW	Hessen	Rheinl.-Pfalz	Bad.-Württ.	Bayern	Saarland	Berlin (W)
0	0,98856	0,09467	0,79242	0,05983	0,00243	0,01468	0,00613	0,00186	0,00663	0,00743	0,00026	0,00222
5	0,99825	0,06104	0,87306	0,03818	0,00152	0,00910	0,00386	0,00114	0,00415	0,00463	0,00018	0,00138
10	0,99661	0,05174	0,88446	0,03253	0,00181	0,00907	0,00409	0,00113	0,00442	0,00492	0,00021	0,00224
15	0,99461	0,09916	0,74560	0,06585	0,00551	0,02543	0,01199	0,00334	0,01326	0,01473	0,00076	0,00899
20	0,99485	0,14709	0,63059	0,09353	0,00898	0,03785	0,01796	0,00459	0,01923	0,02168	0,00126	0,01208
25	0,99430	0,12309	0,69170	0,07787	0,00745	0,03390	0,01482	0,00395	0,01536	0,01734	0,00104	0,00778
30	0,99205	0,09729	0,76905	0,05897	0,00420	0,02274	0,00993	0,00298	0,00987	0,01174	0,00048	0,00481
35	0,99172	0,06381	0,84681	0,03836	0,00273	0,01450	0,00637	0,00190	0,00628	0,00752	0,00032	0,00311
40	0,98540	0,04665	0,88045	0,02789	0,00195	0,01027	0,00459	0,00134	0,00446	0,00537	0,00021	0,00221
45	0,97234	0,03598	0,89327	0,02263	0,00124	0,00646	0,00322	0,00092	0,00327	0,00387	0,00013	0,00134
50	0,95868	0,03322	0,88726	0,02228	0,00086	0,00456	0,00266	0,00072	0,00287	0,00327	0,00013	0,00087
55	0,93520	0,02976	0,87139	0,01991	0,00074	0,00407	0,00236	0,00063	0,00255	0,00290	0,00012	0,00078
60	0,89372	0,02599	0,83907	0,01616	0,00060	0,00366	0,00212	0,00059	0,00220	0,00258	0,00013	0,00061
65	0,82859	0,02228	0,78299	0,01259	0,00046	0,00320	0,00185	0,00057	0,00184	0,00224	0,00012	0,00047
70	0,73545	0,01785	0,69916	0,00990	0,00037	0,00258	0,00143	0,00045	0,00142	0,00179	0,00009	0,00040
75	0,60951	0,01817	0,57266	0,00998	0,00040	0,00265	0,00143	0,00047	0,00141	0,00184	0,00009	0,00041
80	0,40056	0,01125	0,36590	0,00865	0,00054	0,00510	0,00200	0,00093	0,00244	0,00293	0,00016	0,00067

Tab. 3-4 REGION NORDRHEIN-WESTFALEN

0	0,98857	0,00295	0,00105	0,01218	0,00064	0,94331	0,00680	0,00680	0,00647	0,00623	0,00046	0,00166
5	0,99824	0,00168	0,00060	0,00695	0,00037	0,97247	0,00387	0,00389	0,00367	0,00353	0,00026	0,00096
10	0,99660	0,00256	0,00101	0,00925	0,00060	0,96186	0,00508	0,00438	0,00499	0,00469	0,00034	0,00184
15	0,99461	0,00798	0,00341	0,02550	0,00194	0,89565	0,01413	0,01042	0,01453	0,01355	0,00100	0,00651
20	0,99486	0,00967	0,00503	0,03325	0,00294	0,86099	0,01960	0,01409	0,02053	0,01909	0,00141	0,02826
23	0,99433	0,00530	0,00382	0,02173	0,00223	0,89803	0,01479	0,01123	0,01608	0,01514	0,00104	0,00494
30	0,99206	0,00346	0,00238	0,01381	0,00129	0,92983	0,00951	0,00816	0,01026	0,01002	0,00061	0,00275
35	0,99178	0,00228	0,00159	0,00921	0,00087	0,95043	0,00631	0,00546	0,00678	0,00663	0,00040	0,00183
40	0,98528	0,00161	0,00112	0,00651	0,00061	0,95610	0,00447	0,00387	0,00477	0,00466	0,00028	0,00128
45	0,97198	0,00136	0,00065	0,00498	0,00038	0,94910	0,00340	0,00378	0,00359	0,00373	0,00020	0,00082
50	0,95826	0,00149	0,00043	0,00493	0,00029	0,93492	0,00333	0,00465	0,00350	0,00387	0,00018	0,00066
55	0,93494	0,00143	0,00040	0,00470	0,00028	0,91263	0,00319	0,00444	0,00336	0,00370	0,00017	0,00063
60	0,89375	0,00122	0,00039	0,00456	0,00024	0,87264	0,00317	0,00422	0,00315	0,00333	0,00018	0,00064
65	0,82832	0,00092	0,00036	0,00404	0,00019	0,81012	0,00288	0,00364	0,00269	0,00270	0,00017	0,00060
70	0,73441	0,00068	0,00028	0,00298	0,00014	0,72104	0,00212	0,00264	0,00197	0,00197	0,00013	0,00047
75	0,60809	0,00058	0,00024	0,00258	0,00012	0,59655	0,00184	0,00226	0,00170	0,00170	0,00011	0,00041
80	0,37758	0,00022	0,00009	0,00094	0,00004	0,37345	0,00067	0,00079	0,00062	0,00061	0,00004	0,00011

EXPECTED NUMBER OF SURVIVORS AT EXACT AGE X IN EACH REGION

Tab. 3-5 INITIAL REGION OF COHORT HAMBURG

Age	Total	Schl.-Holst.	Hamburg	Ni.-Sachsen	Bremen	NRW	Hessen	Rheinl.-Pfalz	Bad.-Württ.	Bayern	Saarland	Berlin (W)
0	100000.	0.	100000.	0.	0.	0.	0.	0.	0.	0.	0.	0.
5	97932.	10750.	75254.	6921.	290.	1774.	728.	229.	796.	891.	30.	267.
10	97735.	15508.	64008.	10271.	451.	2844.	1146.	379.	1259.	1400.	56.	414.
15	97589.	17783.	58166.	12001.	541.	3467.	1381.	466.	1527.	1693.	71.	493.
20	97072.	19102.	50948.	13660.	778.	4749.	1861.	636.	2099.	2308.	109.	822.
25	96534.	20535.	33192.	17198.	1443.	8798.	3423.	1213.	4050.	4377.	242.	2062.
30	96069.	19818.	24373.	18305.	1767.	11758.	4455.	1622.	5382.	5855.	349.	2386.
35	95437.	19383.	19191.	19046.	1707.	13503.	4972.	1936.	6144.	6719.	385.	2452.
40	94548.	18966.	16729.	19194.	1670.	14280.	5159.	2107.	6469.	7133.	409.	2432.
45	93871.	18582.	15177.	19279.	1652.	14790.	5259.	2243.	6655.	7417.	429.	2388.
50	91786.	17951.	13976.	19023.	1606.	14850.	5248.	2284.	6654.	7479.	433.	2283.
55	88705.	17251.	12785.	18570.	1531.	14471.	5168.	2311.	6571.	7468.	428.	2151.
60	84300.	16283.	11522.	17778.	1438.	13847.	5008.	2303.	6381.	7336.	416.	1989.
65	77483.	14908.	10129.	16420.	1306.	12772.	4672.	2195.	5981.	6930.	390.	1780.
70	67073.	12855.	8392.	14191.	1120.	11140.	4108.	1973.	5274.	6159.	347.	1514.
75	52582.	10010.	6380.	11079.	870.	8813.	3258.	1583.	4201.	4924.	277.	1187.
80	35199.	6649.	4133.	7384.	577.	5965.	2203.	1080.	2855.	3356.	189.	808.
85	18103.	3389.	2012.	3792.	288.	3113.	1147.	570.	1499.	1770.	99.	423.

Tab. 3-6 INITIAL REGION FO COHORT NORDRHEIN-WESTFALEN

0	100000.	0.	0.	0.	0.	100000.	0.	0.	0.	0.	0.	0.
5	97934.	366.	132.	1503.	80.	92327.	841.	835.	808.	779.	58.	205.
10	97737.	561.	200.	2276.	123.	89197.	1278.	1251.	1247.	1209.	92.	303.
15	97589.	665.	236.	2686.	146.	87482.	1512.	1461.	1491.	1447.	111.	351.
20	97072.	987.	404.	3718.	236.	82745.	2128.	1842.	2153.	2086.	162.	613.
25	96539.	1920.	908.	6289.	499.	70696.	3788.	2702.	4052.	3905.	306.	1475.
30	96076.	2201.	1316.	7366.	694.	63626.	4840.	3127.	5436.	5310.	414.	1744.
35	95445.	2402.	1424.	7988.	711.	59452.	5328.	3473.	6232.	6190.	455.	1791.
40	94555.	2521.	1468.	8307.	724.	56828.	5522.	3659.	6600.	6650.	484.	1791.
45	93882.	2605.	1497.	8552.	738.	54972.	5631.	3807.	6822.	6978.	506.	1773.
50	91784.	2606.	1485.	8563.	730.	52861.	5612.	3819.	6831.	7065.	511.	1702.
55	88693.	2595.	1414.	8478.	703.	50104.	5540.	3874.	6770.	7107.	507.	1602.
60	84272.	2540.	1328.	8234.	667.	46641.	5383.	3869.	6602.	7033.	494.	1481.
65	77456.	2400.	1210.	7715.	613.	42072.	5044.	3701.	6218.	6692.	465.	1327.
70	67073.	2130.	1043.	6795.	531.	35728.	4464.	3337.	5507.	5986.	416.	1136.
75	52603.	1695.	819.	5377.	416.	27637.	3553.	2676.	4395.	4804.	334.	895.
80	35230.	1149.	548.	3627.	277.	18282.	2409.	1821.	2992.	3285.	229.	611.
85	18128.	600.	278.	1886.	139.	9264.	1256.	957.	1571.	1736.	120.	321.

3.3. Multiregional Population Projection

Multiregional population projections are a central issue in the IIASA project. The results of these projections illustrate long-term effects of present demographic factors such as fertility, mortality, and mobility on regional population dynamics. To evaluate the long-term effects, multiregional population projections are carried out under the assumptions of constant regional age-specific fertility and mortality conditions as well as age-specific migration rates. Although this assumptions may be unrealistic, the results of such status-quo prognoses present important information, pointing to regional demographic problems that may evolve, should no changes occur in present demographic factors of influence.

We shall briefly discuss some interesting results of these projections. The comparison between 1974 and 1999 (Table 3.7 and 3.8) is of the upmost interest. According to our study, the state population will decrease by 4 million by 1999, i.e. more than 6.5 %. The highest decline is to be expected for the urban counties of Hamburg (-21.3 %), Bremen (-15,6 %), and Berlin (125,4 %) as well as for the counties of Rheinland-Pfalz (-11 %) and Saarland (-22,5 %). The remarkable population decline of the urban counties is mainly due to the current phenomenon of urban-hinterland migration, which in other counties is completely "absorbed", i.e. is intra-regional migration.

The least population decline will occur in the southern German counties of Baden-Württemberg (-2,1 %) and Bavaria (-2,4 %). These developments, in the long run, bring about a considerable spatial redistribution of the population in the FRG territory. Thus, in 1974, some 32,4 % of the total population live in the southern German counties of Baden-Württemberg and Bavaria. In 1999, if conditions remain the same, it will be 34 %. The counties of Schleswig-Holstein, Niedersachsen, and Hessen will also have higher shares of the total population as compared to 1974.

POPULATION PROJECTION

Tab. 3-7 Summary Table 1974

	POPULATION			RATES OF NATURAL INCREASE			INTERNAL MIGRATION RATES			EXT.MIG.	GROWTH
	,000.	%	M. AGE	BIRTH	DEATH	GROWTH	OUT	IN	NET	NET	RATE
Schl.-Holstein	2584.	4.17	36.90	.009880	.012894	-.003014	.023300	.026989	.003689	0.000000	.000675
Hamburg	1734.	2.80	40.29	.007800	.014942	-.007142	.034414	.028518	-.005896	0.000000	-.013038
Niedersachsen	7266.	11.72	36.57	.010702	.012364	-.001662	.016768	.018688	.001919	0.000000	.000257
Bremen	724.	1.17	38.24	.009124	.013119	-.003995	.040505	.035709	-.004796	0.000000	-.008790
NRW	17219.	27.77	36.58	.009814	.011279	-.001466	.010253	.009425	-.000829	0.000000	-.002294
Hessen	5576.	8.99	37.13	.009877	.012072	-.002195	.017534	.019255	.001720	0.000000	-.000474
Rheinl.-Pfalz	3688.	5.95	36.61	.009729	.011860	-.002131	.022047	.020733	-.001313	0.000000	-.003445
Baden-Württemb.	9226.	14.88	35.58	.011076	.010850	.000225	.013768	.014154	.000386	0.000000	.000611
Bayern	10849.	17.50	36.53	.010511	.011717	-.001206	.009656	.011210	.001554	0.000000	.000348
Saarland	1103.	1.78	36.38	.008942	.010943	-.002001	.019113	.012425	-.006688	0.000000	-.008689
Berlin (West)	2034.	3.28	42.00	.008967	.017313	-.008346	.024289	.017749	-.006540	0.000000	-.014886
Total	62003.	100.00	36.78	.010123	.011908	-.001785	.014982	.014982	-.000000	0.000000	-.001785

Tab. 3-8 Summary Table 1999

	POPULATION			RATES OF NATURAL INCREASE			INTERNAL MIGRATION RATES			EXT.MIG.	GROWTH
	,000.	%	M. AGE	BIRTH	DEATH	GROWTH	OUT	IN	NET	NET	RATE
Schl.-Holstein	2496.	4.31	40.59	.009026	.014010	-.004984	.021620	.022839	.001218	0.000000	-.003765
Hamburg	1363.	2.35	42.67	.007298	.015029	-.007731	.033249	.032505	-.000744	0.000000	-.008475
Niedersachsen	7056.	12.18	39.74	.010243	.013695	-.003452	.015944	.016145	.000201	0.000000	-.003251
Bremen	611.	1.05	41.16	.008658	.014355	-.005697	.038896	.037451	-.001446	0.000000	-.007142
NRW	15788.	27.25	40.89	.008936	.014008	-.005072	.009671	.009060	-.000611	0.000000	-.005683
Hessen	5348.	9.23	40.80	.008835	.013919	-.005083	.016494	.017443	.000949	0.000000	-.004134
Rheinl.-Pfalz	3283.	5.67	41.35	.008736	.015105	-.006369	.020164	.020271	.000107	0.000000	-.006262
Baden-Württemb.	9033.	15.59	39.78	.009950	.013146	-.003196	.012781	.012518	-.000264	0.000000	-.003459
Bayern	10592.	18.28	40.38	.009524	.013839	-.004315	.008995	.010102	.001108	0.000000	-.003208
Saarland	855.	1.47	42.71	.007574	.016243	-.008668	.016504	.013461	-.003042	0.000000	-.011711
Berlin (West)	1517.	2.62	41.60	.008465	.014640	-.006175	.024067	.020711	-.003357	0.000000	-.009531
Total	57941.	100.00	40.58	.009270	.013936	-.004666	.013876	.013876	0.000000	0.000000	-.004666

In 1974, four out of the 11 counties still had a positive population growth rate (Schleswig-Holstein, Niedersachsen, Baden-Württemberg, and Bavaria). For 1999 a negative growth rate is expected for all counties. The highest population fall, in terms of growth rate, is expected for the urban counties of Hamburg and Bremen, as well as for Berlin, and the Saarland county.

Also of interest are the effects of population development on the future age structure. With the exception of Berlin we observe a very high share of old population in all the counties. In 1999 the mean age of the population will be about 4 years above that of 1974. In NRW it will rise from 36.6 years in 1974 to 40.9 years in 1999. Only Berlin will experience a decrease in the average age of its population, from age 42 to 41.6 in 1999, mainly due to inmigration of young people and heavy overall out-migration of older people.

3.4. Fertility and Migration Analysis

The analysis of fertility and migration in the federal counties is based on two indicators: the net-reproduction rate (NRR) and the net-migration rate (NMR). Both indicators can be calculated by using the model of multiregional life tables.

The net-reproduction rate measures the average number of daughters born to a new-born girl within her reproductive period, assuming that the age-specific rates of fertility and mortality remain constant for a sufficiently long time. Under this assumption a NRR greater than 1 means a growing population, NRR = 1, a static or stationary population, and a NRR of less than 1 a declining population.

The net-reproduction rate calculated on the basis of multiregional life table considers, in addition to fertility and mortality, the impact of migration on the reproductive capacity of a population. Thus we are able to gain regionally differentiated and deeper insights into the population's reproductive capacity.

The last line in the NRR-matrix illustrates the net-reproduction rates of the babies born in the counties (Table 3.9). In 1974, all counties had values below 1. These values reflect the present fertility of the FRG, and point to the fact that in the long run there will a population decrease in all counties. Net-reproduction rates are still relatively high in the predominantly rural counties, such as Niedersachsen, Rheinland-Pfalz, Bavaria, and Baden-Württemberg, which have a high share of foreigners with a high fertility rate. The column elements of the NRR-matrix illustrate the regional distribution of the reproductive capacity of those born in a specific county. Table 3.10 gives an insight into the regional distribution of that reproduction capacity. It illustrates that, of the average of 0.67 children born to a birth cohort of Hamburg, only 29 % will be born in Hamburg, 21,5 % will be born in Schleswig-Holstein, 20,5 % in Niedersachsen, and the remaining births will be spread evenly over the remaining counties. A birth cohort of Bremen "exports", so to say, almost 40 % of its reproductive force to Niedersachsen, while only some 25 % remains for Bremen itself. However, almost 74 % of the offspring of Bavaria-born parents will be born in Bavaria. For NRW, the percentage is 72 %.

Similar to the net reproduction rates, one may calculate the net-migra-production rates (NMR). The elements of the NMR matrix illustrate how many migrations between regions a person, born in a specific region is expected to undertake. It should be stressed once more, that, as in the calculation of NRR, the impact of regional mortality patterns is considered in computing NMR.

Table 3.11 shows that persons born in the two urban counties of Hamburg and Bremen, are by far the most mobile. During their lifetime they will undertake on the average almost two migrations between counties. It must be noted, however, that some persons do not migrate at all and others migrate three times or more. The lowest mobility (0.87 and 0.80) is to be found in the two largest counties, NRW and Bavaria. This again demonstrates that in the larger counties, such as NRW and Bavaria, the chances of finding a satisfactory living place in one's own region of birth are very high, making out-migration into another county unnecessary.

FERTILITY EXPECTANCIES

Tab. 3-9 EXPECTANCIES

	Total	Schl.-Holstein	Hamburg	Ni.-Sachsen	Bremen	NRW	Hessen	Rheinl.-Pfalz	Bad.-Württ.	Bayern	Saarland	Berlin (W)
Schl.-Hl.	05775	.33792	.14340	.03017	.03857	.01314	.01090	.00956	.00874	.00735	.00940	.02615
Hambg.	.02966	.05995	.19354	.01849	.01737	.00552	.00535	.00410	.00404	.00348	.00348	.01098
Ni.-Sa.	.11130	.09588	.13671	.45042	.27993	.05053	.03915	.02856	.02453	.01990	.02092	.07780
Bremen	.02139	.00848	.00912	.01963	.17798	.00335	.00309	.00222	.00215	.00180	.00179	.00568
NRW	.11284	.07420	.06700	.09756	.08369	.50454	.07223	.10590	.04793	.03894	.06482	.08444
Hessen	.06635	.02415	.02450	.02739	.02841	.02683	.39202	.06722	.03443	.02653	.04081	.03758
Rh.-Pf.	.05243	.01168	.00937	.01071	.01085	.01973	.03432	.33971	.02451	.01190	.08816	.01580
Bad.-W.	.09027	.03542	.03298	.03263	.03489	.03331	.06178	.08004	.48504	.06828	.07380	.05483
Bayern	.08954	.03565	.03514	.03084	.03309	.03188	.05775	.04612	.08216	.52519	.04271	.06434
Saarl.	.03294	.00226	.00165	.00158	.00170	.00205	.00404	.01711	.00434	.00221	.32217	.00316
Bln.W.	.03635	.01336	.01182	.01271	.01259	.00859	.00942	.00825	.00879	.00739	.00731	.29966
Total		.69895	.66523	.73213	.71907	.69949	.69006	.70879	.72668	.71298	.67538	.68043

Tab. 3-10 NET ALLOCATIONS

	Total	Schl.-Holstein	Hamburg	Ni.-Sachsen	Bremen	NRW	Hessen	Rheinl.-Pfalz	Bad.-Württ.	Bayern	Saarland	Berlin (W)
Schl.-H.	.08333	.48346	.21556	.04121	.05364	.01878	.01579	.01349	.01203	.01031	.01392	.03843
Hambg.	.04357	.08577	.29093	.02526	.02416	.00789	.00775	.00578	.00556	.00488	.00516	.01614
Ni.-Sa.	.15668	.13718	.20551	.61521	.38929	.07224	.05674	.04029	.03376	.02791	.03098	.11434
Bremen	.02991	.01213	.01372	.02681	.24752	.00479	.00448	.00313	.00296	.00253	.00264	.00835
NRW	.16114	.10616	.10072	.13326	.11638	.72130	.10467	.14941	.06596	.05462	.09598	.12410
Hessen	.09544	.03455	.03682	.03741	.03951	.03836	.56810	.09484	.04738	.03722	.06042	.05523
Rh.-Pf.	.07472	.01672	.01408	.01462	.01509	.02820	.04974	.47928	.03373	.01669	.13054	.02322
Bad.-W.	.12696	.05067	.04958	.04457	.04852	.04763	.08953	.11292	.66748	.09577	.10928	.08058
Bayern	.12671	.05100	.05283	.04212	.04602	.04558	.08369	.06507	.11306	.73662	.06324	.09456
Saarl.	.04854	.00323	.00248	.00216	.00236	.00294	.00586	.02415	.00598	.00310	.47702	.00465
Bln.W.	.05300	.01911	.01777	.01736	.01751	.01228	.01365	.01163	.01210	.01036	.01082	.44040
Total		1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000

MOBILITY EXPECTANCIES

Tab. 3-11 EXPECTANCIES

	Total	Schl.-Holstein	Hamburg	Ni.-Sachsen	Bremen	NRW	Hessen	Rheinl.-Pfalz	Bad.-Württ.	Bayern	Saarland	Berlin (W)
Schl.-H.	.13799	.85887	.31275	.06707	.08358	.02998	.02530	.02209	.02037	.01722	.02118	.05949
Hamburg	.13857	.22834	.99004	.07402	.07039	.02425	.02347	.01830	.01812	.01576	.01559	.04597
Ni.-Sa.	.16980	.13900	.19875	.73795	.39865	.07458	.05858	.04350	.03769	.03096	.03233	.11578
Bremen	.10909	.03412	.03689	.07544	.96755	.01429	.01320	.00973	.00934	.00794	.00787	.02356
NRW	.11996	.07844	.07241	.10096	.08832	.53491	.07831	.10885	.05350	.04420	.07019	.08945
Hessen	.12059	.04447	.04525	.04985	.05139	.04927	.72033	.11457	.06241	.04895	.07231	.06771
Rh.-Pf.	.11968	.02627	.02182	.02473	.02496	.04394	.07341	.80882	.05323	.02695	.17713	.03527
Bad.-W.	.11459	.04485	.04235	.04194	.04449	.04307	.07712	.09680	.62764	.08426	.08943	.06854
Bayern	.08422	.03327	.03304	.02940	.03128	.03039	.05347	.04282	.07409	.49970	.03965	.05927
Saarl.	.07456	.00462	.00345	.00332	.00351	.00429	.00828	.03339	.00876	.00456	.73949	.00649
Bln.W.	.09929	.03440	.03119	.03302	.03286	.02291	.02520	.02207	.02326	.02028	.02000	.82705
Total		1.52664	1.78795	1.23771	1.79698	.87190	1.15667	1.32093	.98841	1.80078	1.28515	1.39860

Tab. 3-12 NET ALLOCATIONS

	Total	Schl.-Holstein	Hamburg	Ni.-Sachsen	Bremen	NRW	Hessen	Rheinl.-Pfalz	Bad.-Württ.	Bayern	Saarland	Berlin (W)
Schl.-H.	.09203	.56259	.17492	.05419	.04651	.03439	.02187	.01672	.02061	.02150	.01648	.04254
Hamburg	.08611	.14957	.55373	.05981	.03917	.02782	.02029	.01385	.01833	.01968	.01213	.03287
Ni.-Sa.	.12492	.09105	.11116	.59622	.22185	.08553	.05065	.03293	.03813	.03866	.02515	.08278
Bremen	.06544	.02235	.02063	.06095	.53843	.01639	.01142	.00737	.00945	.00992	.00612	.01685
NRW	.11037	.05138	.04050	.08157	.04915	.61350	.06771	.08240	.05413	.05519	.05461	.06396
Hessen	.10166	.02913	.02531	.04028	.02860	.05651	.62276	.08673	.06314	.06112	.05627	.04841
Rh.-Pf.	.09455	.01721	.01220	.01998	.01389	.05040	.06346	.61231	.05386	.03366	.13783	.02522
Bad.-W.	.10544	.02938	.02369	.03389	.02476	.04940	.06667	.07328	.63500	.10522	.06959	.04901
Bayern	.08792	.02180	.01848	.02375	.01741	.03486	.04622	.03242	.07496	.62402	.03086	.04238
Saarl.	.05832	.00302	.00193	.00268	.00195	.00492	.00715	.02528	.00886	.00570	.57541	.00464
Bln.W.	.07323	.02253	.01745	.02667	.01829	.02628	.02179	.01671	.02353	.02533	.01556	.59135
Total		1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000

Table 3.10, Table 3.11 illustrate the regional distribution of mobility. As is to be expected, most migrations occur out of the counties of birth. Thus, some 63 % of the persons born in Baden-Württemberg who undertake migration, will migrate out of Baden-Württemberg. It is only 53.8 % in the urban county of Bremen, however. But 22 % of all persons born in Bremen, who are likely to migrate, will migrate out of Niedersachsen. On the other hand, only 6 % of the potential migrants born in Niedersachsen will migrate out of Bremen.

Within the frameworkof demographic analysis, the NRR matrix and NMR matrix are certainly of great importance, because they offer deep insights into the complex interdependence of regional fertility, mortality and migration patterns. On the other hand, their degree of complexity is so high that a generally plausible interpretation is therefore so difficult that the general applicability for planning purposes of these matrices has been questioned. Their calculation, moreover, requires many and detailed data, and therefore, their use in practice is restricted. Finally, we would like to mention again that we are dealing here with models whose results depend on the respective model premises.

4. Alternative Approaches for Regional Population Analysis and Projection, and their Application in Regional Planning

4.1. Analysis and Projection of Population Dynamics with a Markov Model

So far planning practice has used conventional migration indicators such as net migration, volume, and efficiency. These measures, however, do not take multiregional interdependence and time dynamics into account. Research at the BFLR has therefore, for some time, been oriented towards elaborating an improved measurement of the dynamics of migration in its space and time dimension.

The Markovmodel has proved useful for the analysis and projection of the spatial-temporal dynamics of interregional migration.

In the Markov model it is assumed that migration processes all have a Markovian property: the future developments of the process can be derived from knowing its current state.

The analysis and projection of population development based on the Markov model do not consider regional fertility and mortality patterns. Only migrations affect regional population distribution. In addition, it is assumed that the basic migration patterns do not change over time. The following indicators are derived from the Markov model:

a) Average duration of stay: provides information on the duration of the time span a random person will remain in a region before migrating.

b) Mean return time: expresses the average number of intervals, resp. time periods a random individual needs to return to a region after having left it.

c) Mean first passing time: the average number of time periods an individual needs to first reach a region A when coming from region B.

d) Equilibrium distribution: expresses the ultimate regional population distribution, under the assumption that no changes in the current patterns of migration occur.

Some results are presented here.

The average duration of stay shows that people of ages 18 to 30 are by far more mobile than older people. Moreover, it can be shown that duration of residence tends to be longer in more densely populated areas than in less densely populated ones. An average person in age group 18 - 30 will migrate out of a rural region after 14 years, but out of a densely populated area only after 32 years (Table 4.1).

The mean return time shows the bond of a population to its region. It can be noted that return migration is more likely in a more densely populated than a sparsely populated area. Young people who migrate from rural areas have the least likelihood of returning there. Migrants from densely populated regions are 6 times as fast in returning to urban areas than migrants from rural regions to their origins (Table 4.1).

The mean first passage time may be used to illustrate that a person chosen at random between the age of 18 and 30 living in a densely populated area will migrate into a rural region after 138 years only. A person of the same age group living in a rural region, however, will migrate to a densely populated area after 26 years. Basically, it is shown that persons in the 18-30 age groups tend to migrate much sooner from a sparsely populated region into a densely populated one than vice versa (Table 4.2)

Out-migration of persons in the 18-30 age group from rural areas into agglomerations will be expected to grow in the long run. Regions such as Hamburg, Köln/Bonn, Frankfurt, Stuttgart and Munich will thus experience high migration gains (Map 4-1). The portion of that age group living in densely populated areas will, in the long run, increase by 3.4 %; i.e. some 55 % of that age group will be living in densely populated areas.

In contrast, there will be more people of over 50 years of age migration into rural areas from densely populated ones. Regions in southern Germany, such as the Schwarzwald, Bayerischer Wald and Alpenvorland in particular are gaining older people through migration (Map 4-2). In the long run, this age group's share of the total FRG population will increase by 4.6 %; and some 16 % of this age group will be living in rural areas (Table 4-3).

The concept of the Markovian model constitutes a renunciation of descriptive approaches. Calculation of indicators based on probability theory will result in improved, more comprehensive and, above all, more plausibe possibilities of defining inter-regional migration. Statistics such as the average duration of stay, mean return time, mean first passage time and equilibrium distribution, have some great advantages over conventional indices, such as net migration and efficiency. With these indices it is possible to regard the whole network of migration flows, and, at the same time, to study the time aspect of interregional migration. This second aspect makes such indices interesting for the impact analysis of regional policy measures conceived in order to influence interregional migration.

Tabelle 4-1 Table 4-1. Mean duration of stay and mean return time (Markov model).

Mittlere Verweilzeiten (V) und mittlere Erstrekurrenzzeiten (MRT)

Strukturelle Gebietskategorien Regional categories	18-30 18 bis unter 30 Jahre		50+years 50 Jahre und älter	
	V	MRT	V	MRT
Stark verdichtete Regionen	32,4	1,8	180,2	2,5
Regionen mit Verdichtungsansätzen	16,3	6,5	145,7	5,7
Regionen mit Zentrum über 100 000 EW.	16,0	4,9	153,0	3,8
Ländliche Regionen	13,8	10,8	154,4	6,2

-highly urbanized areas
-moderately urban. areas
-regions with centers above 100,000 inhab.
-rural areas

Tabelle 4-2 Table 4-2. Mean first passage time of population of age 18 to 30. (Markov movel).

Mittlere Erstdurchlaufzeiten der Einwohner im Alter von 18 bis unter 30 Jahren

from / von — to / nach	highly urb. areas stark verdichtete Regionen	mode.urb. Regionen mit Verdichtungs-ansätzen	centers above 100,000 Regionen mit Zentrum über 100 000 EW.	rural areas Ländliche Regionen
Stark verdichtete Regionen	1,8	90,5	64,2	138,2
Regionen mit Verdichtungsansätzen	27,2	6,5	60,2	136,9
same Regionen mit Zentrum über 100 000 EW	26,4	85,5	4,9	131,8
Ländliche Regionen	25,9	89,5	57,7	10,8

Tabelle 4-3 Table 4-3. Population projection and population distribution (Markov model).

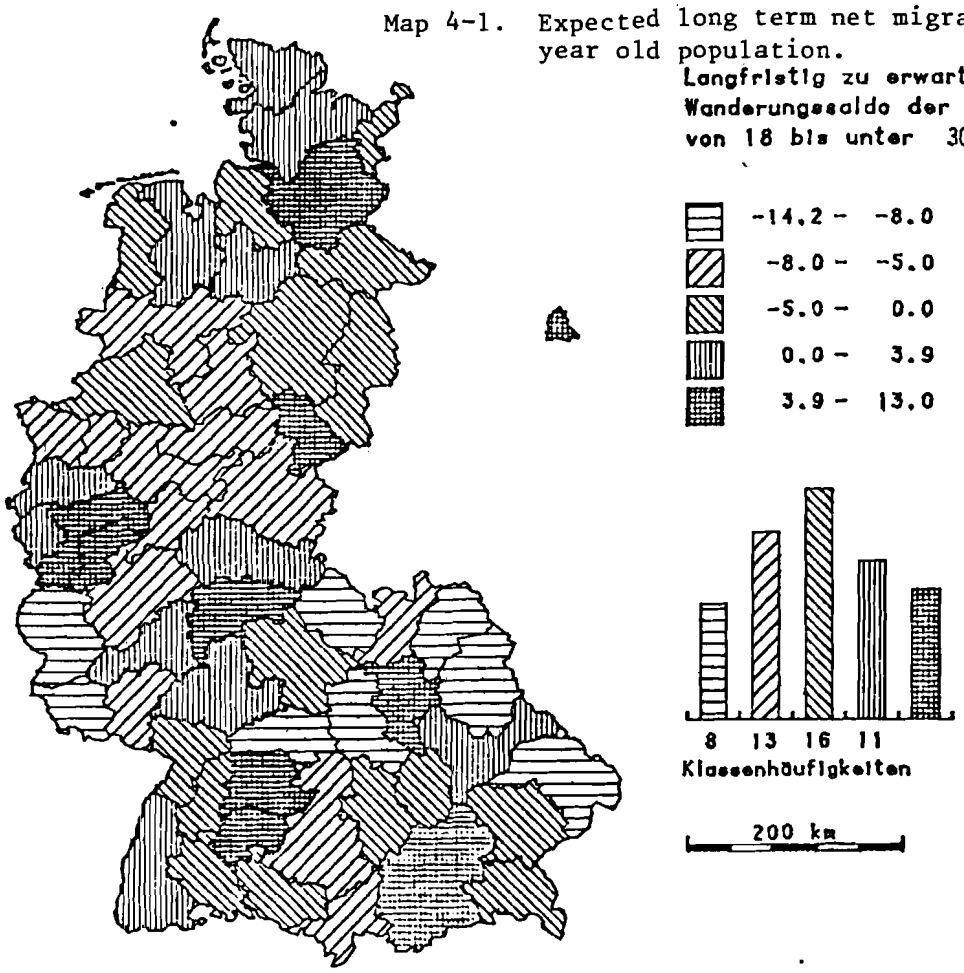
Bevölkerungssegregation

Impact of selective migration on regional population distribution.

Auswirkungen selektiver Wanderungen auf die regionale Verteilung der Einwohner

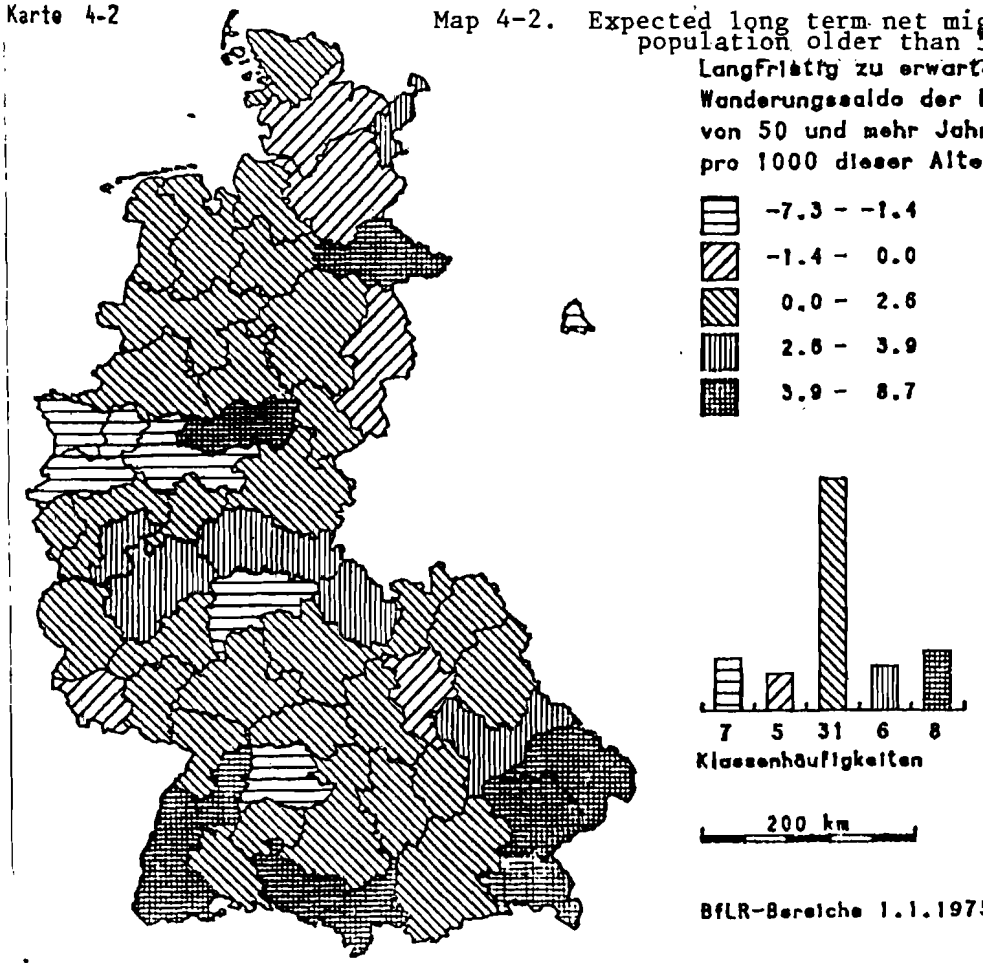
Strukturelle Gebietskategorien Regional categories	18-30 years von 18 bis unter 30 Jahren			50+ years von 50 und mehr Jahren		
	1975	1990	steady state	1975	1990	steady state
Stark verdichtete Regionen	51,5	53,7	54,9	51,9	50,5	40,8
Regionen mit Verdichtungsansätzen	15,9	15,6	15,5	16,2	16,4	17,3
same Regionen mit Zentrum über 100 000 EW.	21,8	20,9	20,4	20,7	21,5	26,2
Ländliche Regionen	10,8	9,7	9,2	11,1	11,7	15,8
Bundesgebiet	100,0	100,0	100,0	100,0	100,0	100,0

Map 4-1. Expected long term net migration of 18-30 year old population.



Karte 4-2

Map 4-2. Expected long term net migration of population older than 50 years of age



Moreover, indicators based on probability theory offer a real possibility for the derivation of hypotheses and the explanation of individual behavior. This is important, since only the knowledge of the reasons for individual migration decisions will offer plausibe explanations for migration flows.

It should not be ignored, however, that a number of concrete problems stand in the way of the broad practical application of either the Markovian or the multiregional demographic model of analysis and projection developed at IIASA -- besides an initial distrust of new approaches. The main problem is to find sufficiently realistic assumptions. These models, moreover, often require data that are not always available, especially on a regional level. This should be no obstacle, however, to utilize and to elaborate on these models.

4.2. Models of Regional Population Forecast

4.2.1. Labor-Market Oriented Migration Forecasts

There is a certain tradition of carrying out population projections for regional and county planning in the FRG. The first regional forecast was published in the Regional Planning Report of 1968. The method used for these regional forecasts, and also for the status-quo prognosis of the Federal Program of Regional Planning has been revised only slightly over the years. It contains some serious weaknesses with regard to migration. For instance, it assumes that migration is affected by economic factors only. Demand and supply of labor force are projected separately on a regional basis, and compared at a particular point in time. It is assumed that surplus and deficits of labor force are made up for by migration. Family members of the migrating labor force are added as a lump sum. The final net migration flow thus obtained is added to the natural population figures estimated for the final point of time in the forecast.

The assumption that regional labor supply and demand are always adjusted through migration, and the fact that the contribution of migrants to natural demographic change is not taken into account, are important weaknesses. Therefore, nothing can be said about the population's age structure at the end of the forecast period. In this model, migration is almost solely economically determined. The volume of accompanying population is not broken up by region (50 % of the total net migration). Migrations that are not economically induced such as educational and retirement migration, are included in that "accompanying" population, although their migration resulted from different decision patterns. Finally, all statements are fixed onto one specific date, e.g., the final year of forecast, 1985. This means that no statement about population dynamics can be made for the period between the beginning and the end of the projection.

Figure 4-1. Labor-market oriented migration model (labor-market balance model).

Abb. 4-1: Arbeitsmarktorientertes Wanderungsmodell (Arbeitsmarktbilanzansatz)

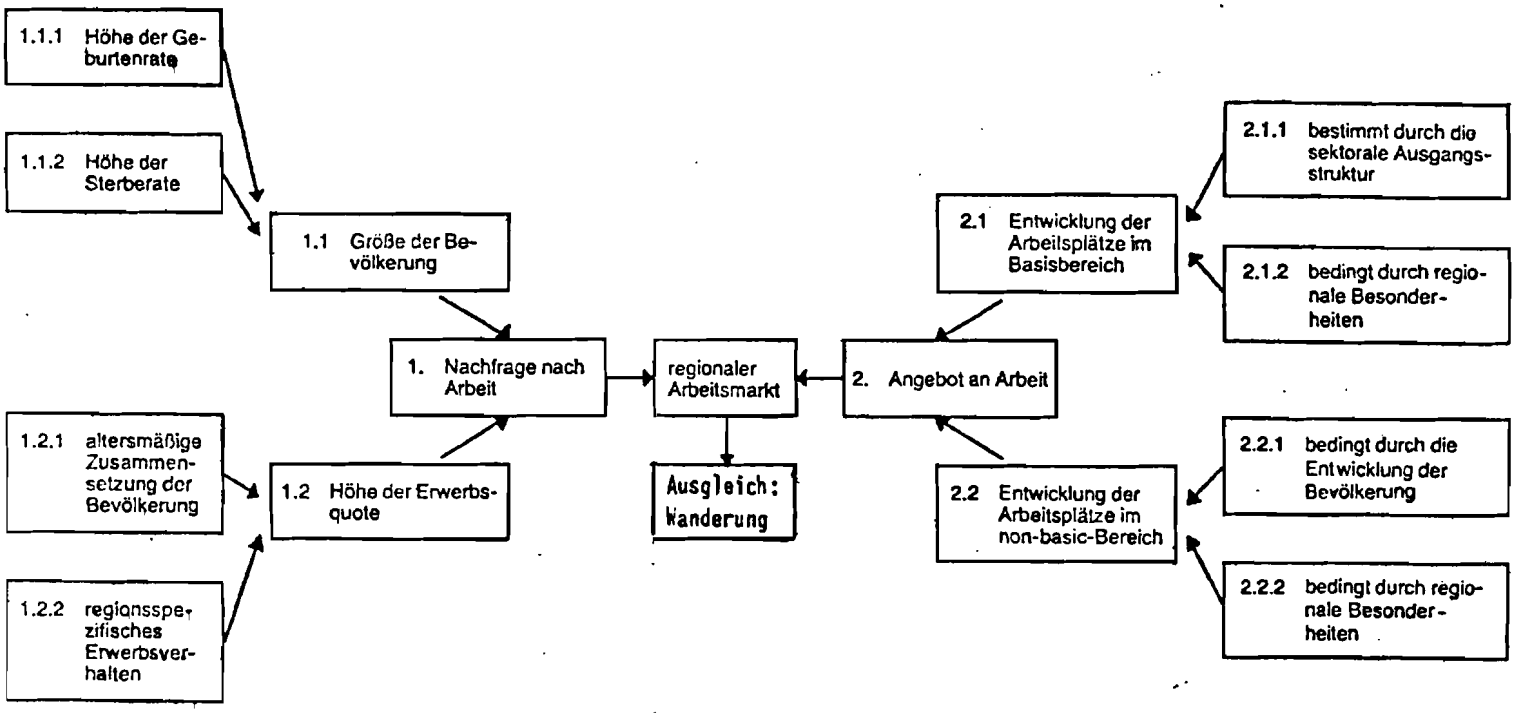
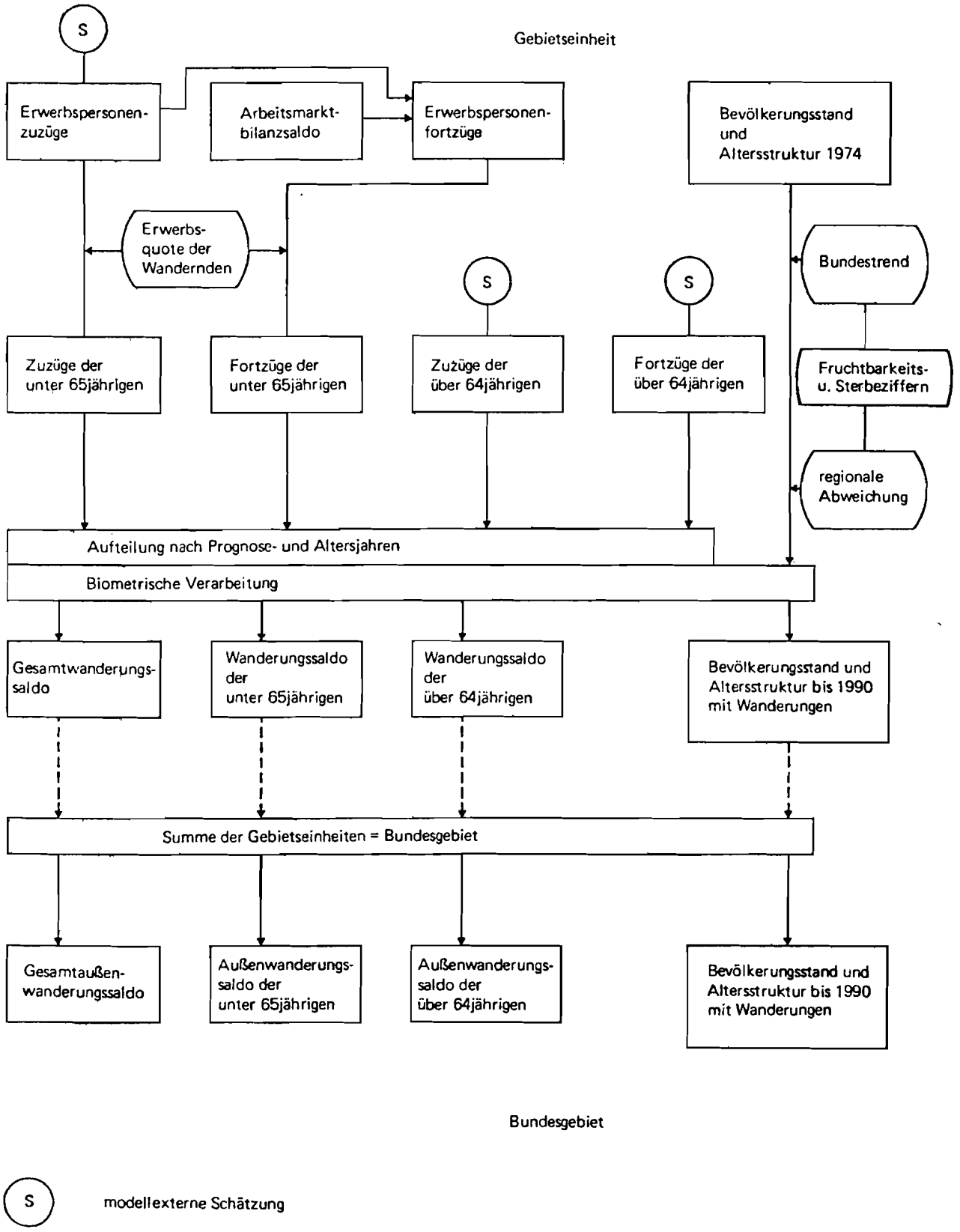


Figure 4-2. Migration module of labor-market balance model.

Abb. 4-2: Wanderungsteil des erweiterten Arbeitsmarktbilanzansatzes



In the Regional Planning Forecast 1990, the most recent comprehensive regional prognosis of the FRG, these weaknesses were largely overcome. The forecast still uses the labor-market balance and confronts job situation and labor-market supply on a regional level. This labor-market balance is interpreted as the active population's migration balance. The accompanying population is obtained by means of empirically derived proportionality measures, and the migration of the over 64 years old is obtained by external estimate. In- and out-migration are allocated to the single age groups, and summed up annually for the population prognosis model. Thus, it was possible to break up the results of the Regional Planning Forecast 1990 by age groups, and to thus satisfy an important requirement of regional population prognoses for such uses as infrastructure planning.

4.2.2. Macro-analytical Simulation Model (RESIPOP)

Research at BFLR on the forecasting of migration does not only cover the labor-market oriented approach. A migration model is being developed that is based on behavorial and decision-making theory. According to recent findings in migration research it is appropriate to distinguish at least two phases in the decision-making process of interregional migration: the decision for out-migration from a region and the search and selection of a new region among alternative destinations.

The migration model is based on this hypothesis and is characterized by four factors:

a) Similarly to the two phases in the decision-making process of interregional migration, we distinguish between a causative and a distributive model of interregional migration. The causative model determines whether a decision-unit migrates or not. The outcome is the total number of outmigrants by region. The explanatory factors serving this causative model are mostly individual factors, such as age, number of previous migrations, and duration of stay at last location.

b) The distribution of the migrants is done by means of a distributive model (Morrison, 1973). It considers factors of attractiveness in destination and origin, andtakes into account distance, information and cost components .

c) The volume of intraregional migration is taken as an indicator for the possibilities available in any region to compensate interregional migration by intraregional migration. Thus the volume of interregional migration of a region depends on the volume of intraregional migration.

d) Individual factors such as age and state in the life cycle are of fundamental significance for the decision to migrate. Since only age-specific migration data are available,work is done with the assumption that specific phases in the life cycle are associated with a specific age (Gatzweiler, 1975). Accordingly, we distinguish four groups of migrants:

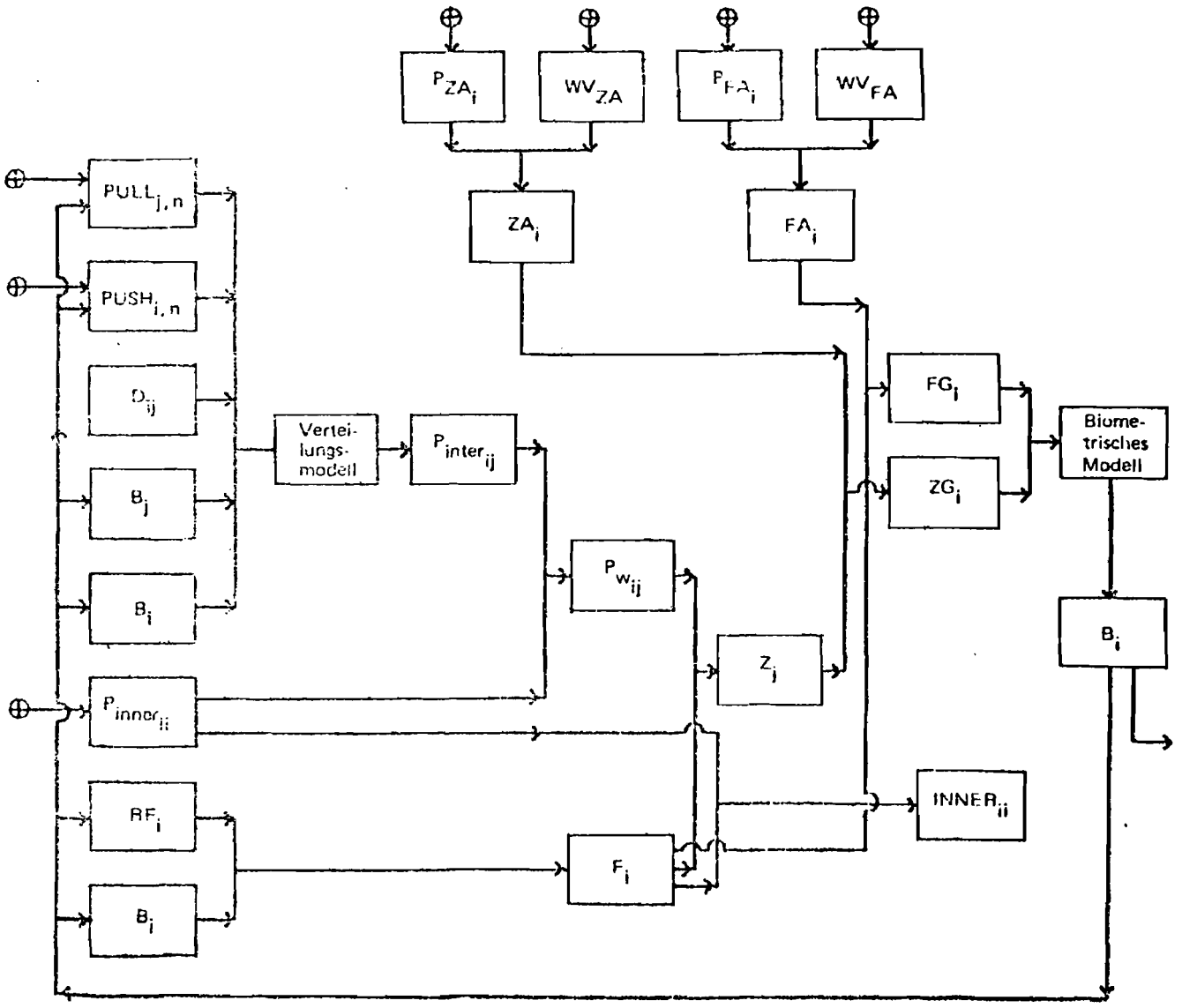
- 18-24 year olds: educational and training migrants;
- 25-29 year olds: qualified employment migrants,
- 39-49 year olds (and including the under 18 year olds): residential and environmental migrants; and
- over 49 year olds: retirement migrants.

The migration model is composed of sub-models, one for each migrant category. The point of departure for formalizing the sub-models of the migration distribution model are age-specific internal migration matrices showing migration flows between 58 upper-central areas. Gravity models are the basis for estimating these matrices; the models formalize the hypothesis that the number of persons changing their residence from region i to region j, is directly proportional to the size of the population of both regions and conversely proportional to the distance between them.

By introducing additional determinants of the decision-making process of migrating, the gravity models are extended in substance and given a theoretical underpinning (Lowry, 1966; Rogers, 1968). These determinants are 'push-factors' in the regions of origin, and 'pull-factors' in the destinations. The linking of

Figure 4-3. Structure of migration module in RESIPOP.

Abb. 4-3: Formale Struktur des Wanderungsmodells in RESIPOP



Komponenten des Wanderungsmodells

B_i	=	Bevölkerungsstand in den Herkunftsregionen
B_j	=	Bevölkerungsstand in den Zielregionen
D_{ij}	=	Matrix der physischen Distanzen (in km) zwischen den Regionen
$PUSH_{i,n}$	=	Modellvariablen bzw. Push-Faktoren in den Herkunftsregionen
$PULL_{j,n}$	=	Modellvariablen bzw. Pull-Faktoren in den Zielregionen
$P_{inner_{ij}}$	=	Diagonalmatrix innerregionaler Wanderungswahrscheinlichkeiten (Fortzüge)
P_{ZA_i}	=	Außenwanderungszuzugswahrscheinlichkeiten
P_{FA_i}	=	Außenwanderungsfortzugswahrscheinlichkeiten
WV_{ZA}	=	Zuzüge aus dem Ausland in das Bundesgebiet
WV_{FA}	=	Relatives Binnenwanderungsvolumen in den Regionen (Fortzüge)
ZA_i	=	Zuzüge aus dem Ausland
FA_i	=	Fortzüge ins Ausland
$P_{inter_{ij}}$	=	Matrix interregionaler Wanderungswahrscheinlichkeiten (Fortzugswahrscheinlichkeiten) von Regionen i nach Region j
$P_{w_{ij}}$	=	Matrix der Binnenwanderungswahrscheinlichkeiten (einschließlich der innerregionalen Wanderungswahrscheinlichkeiten) von Region i nach Region j
F_i	=	Binnenwanderungsfortzüge
Z_j	=	Binnenwanderungszuzüge
$INNER_{ii}$	=	Vektor bzw. Diagonalmatrix des innerregionalen Wanderungsvolumens
ZG_i	=	Gesamtwanderungszuzüge
FG_i	=	Gesamtwanderungsfortzüge

the causative and distributive models is done by applying matrix algebra. The model may be elaborated using age- and sex-specific data on arrivals and departures. Thus, the population in each region is obtained out of the natural population dynamics including migrations.

The model's formal structure corresponds to a macro-analytical simulation model. The model is dynamic; interactions and dynamic feed-back are included in the form of recursive relationships. A change in the population composition as well as a change of a particular migration flow bring about changes in the population composition of all the other regions and in all the other migration flows. At present we are making our explanatory migration models dynamic.

4.2.3. Recursive Application of Multiregional Population Projection Models

The application of multiregional population analysis is not purely limited to demographic analysis and trend projections. When developed further, the model may have regional planning applications, especially, if it would be able to determine the migration interactions needed for obtaining target population distributions. A model developed for that purpose, 'DISPAS' (Demographic interregional forecast and analysis system), can examine whether certain target population sizes can be reached under the given biometric trends and migration interactions. A few examples from sub-fields of the planning process, hitherto undertaken rather unsatisfactorily with the help of conventional methods available, will illustrate our point.

1) The DISPAS model allows for an improved plausibility-test of projection results, obtained by different methods. The regional results are fed into the DISPAS model as target values. All premises of natural population dynamics are applied accordingly. Under these conditions, the DISPAS-model defines migration interactions necessary for obtaining those population sizes that were obtained by other projection methods. These migration flows can

be compared with current migration flows and with projected trends. Large deviations may stimulate research on whether we are confronted with a reverse in trends or whether external premises, e.g., employment prognosis, will not be fully realized.

2) The aggregation of various regional forecasts generally leads to an overestimation of the population of the nation. This situation was particularly obvious between the country and the counties during preparations for the Regional Planning Program. The aggregate status-quo-prognosis value for the population was some 10 % above that projected on the state level. In the Regional Planning Program, the problem was solved by dropping all approximate values of population and job situation. The DISPAS model contributes to a more rational solution to the problem, and notes at the onset that migrational moves are the reason for obtaining excessively high values in some counties. Since we now know, who the loser is in the case of population gains in some counties, a direct discussion can be initiated.

3) One problem, not yet solved satisfactorily, is the integration of regional planning policy objectives and policy instruments in regional planning. The DISPAS model enables us to compute long-term target values at the planning horizon. This way, the target values-approach can be introduced in the regional planning process. Trend projections carried out so far within the framework of the joint project of 'Regional Economic Growth', do not, for example, sufficiently consider regional planning aspects. Here now the target values of population, calculated with the IIASA model, can be set off against the trend-projected values. Discrepancies may lead to adjusting the policy instruments or to a re-evaluation of the initial targets.

4.2.4. Evaluation of Approaches for Regional Population Forecasting

It is not the priority objective of regional population forecasts in planning to make as exact an estimate of future population as possible. Rather, it is important to distinguish regions

for which migration losses are to be expected due to unfavorable labor and environmental conditions, from those that may expect migration gains. Such a status-quo-forecast may then be used to derive measures for abolishing discriminating structures in employment. These measures aim at preventing the prognosis-results from realising. Regional population prognosis is thus used as a prospective indicator for regional development.

In addition, it has a function in defining the objectives or regional planning. If, for example, it is found that some particular, thinly populated peripheral region will experience further heavy population decrease, regional population forecasting may be a stimulus for reexamining the objectives of regional planning. The opinion is held that, in the case of a disperse settlement structure, the maintenance of infrastructural supplies, as postulated within the objective of an equilibrium of living conditions, is not possible.

Regional population prognosis also has a coordinating function. If applied appropriately, it is suitable for reconciling measures of regional relevance, between various specialized branches. This requires the availability of branch-specific parameters either in or tied to the prognosis.

In order to be rationally applied in these fields, regional population projection models should fulfill the following requirements.

1) The projection models should be made applicable to the political decision-making process. For that it is necessary to make calculations imitable and to test their plausibility.

2) Submodels for the migration prognosis should be based on operational and realistic hypotheses about migration patterns. An important premise for that is the distinction of migrant-groups of varying migrational behavior, such as economically and non-economically determined migration.

3) The effects of migration on population structure and natural population dynamics should be made apparent. This re-

quires a prognosis of migrations broken up by age groups.

4) Model-endogenous changes of explanatory variables, i.e. feed-back processes, should be made possible in order to depict system-determined trend-reverses.

5) The point of departure for testing regional planning policy instruments that influence migration should be included in the models.

When comparing these requirements with the various regional projection- and prognosis approaches the following can be said:

The multiregional population projection model used in the comparative study of migration and settlement patterns, set against these requirements, can be regarded as a handy trend-projection model only. All data are taken from the past development of the population, but its connections with other areas, such as labor-market dynamics, that could essentially influence population dynamics through migration, are missing. Assumptions and hypotheses that are to be examined in respect to their impact on population dynamics, must be externally defined. It is not suitable, moreover, to describe im- and emigration across the state boundaries. Therefore, this model cannot be used for long-term forecasting without the help of other projections having a higher level of explanation. For short- and medium term projections, it is, however, quite appropriate in the planning process.

The labor-market balance approach has some great advantages to offer here. First, it involves far less data preparation work than the trend projection or the simulation model. Secondly, this model in its basic structure, is meanwhile known in almost all the institutions dealing with regional planning in the FRG, and is said to be practical and easy to implement. Calculations for single regions can be made without great effort with a desk calculator.

Only the two prognoses models enable the testing of regional planning policy instruments influencing migration. The use of different instruments in regional planning policy (e.g., enforced job creation or job protection) can be tested by changing various

parameters. The intellectual and methodical preparations for the simulation model are probably more demanding. All three approaches that fulfill the requirements of economically and non-economically motivated migration should be distinguished. The simulation is superior to the other approaches in the respect that it distinguishes four groups of migrants, to whom varying migration motives can be allocated.

These approaches also enable one to investigate the impact of migration on natural population dynamics. Here, the multiregional population analysis and simulation model have some advantages, as they are real growth models, while the extended labor-market-balance model requires some interpolation at specific points in time.

Model-endogenous changes of explanatory model variables can only be derived from the simulation model. The labor-market-balance model, on the other hand, requires combining population prognosis and job forecasting. The simulation model in its present structure only, allows a status-quo estimate of tendencies at the labor-market.

At the present stage of research and model building none of these three approaches can clearly be given preference. The advantages of multiregional population analysis and projection are given in the numerous possibilities of demographic analysis of regional population dynamics and therefore, are prerequisites for regional population forecasting with the help of other methods. Recursively applied, they can also contribute to the testing and interpreting of results that were obtained with different projection techniques.

Both of the other approaches have obvious advantages as well as disadvantages, so that they are appropriate for simultaneous use and elaboration. This can be profitable for the mutual control and plausibility of prognosis results. As can be judged already, however, the construction of the labor-market balance model is feasible only in the direction of a simulation model. The present labor-market situation needs a refined description in a model of

the regional compensation of labor-market, that includes all determinant dimensions, such as decline of employment rate, increase of commuting migration, and increase of out-migration. Easy access to statistical data is a principal condition for constructing and applying such regional population prognosis models. For the time being, investment in labor and time for preparing regional projections are too high, since there is no standard procedure for such data on magnetic tapes in the Statistical County Offices.

5. Objectives and Instruments of Spatial Population Distribution

Population is of dual relevance for regional planning. On the one hand, population in a region can be considered as given. Planning has then to adjust to its volume and needs. As such, it is the research object of multiregional population analysis.

On the other hand, population in a region is regarded as a variable that adjusts to varying regional conditions (Koch, 1976, p.184). This makes it theoretically possible to influence the number, distribution and structure of the population by changing the spatial, and social conditions.

This can be done in some cases even through direct state intervention: the following is an illustrative example.

In the early years of economic boom around 1970, there existed no objectives of how much and in which regions the country's population should increase through immigration from abroad. In 1975, a migration stop for foreigners was introduced for some urban areas, following massive pressure from the cities concerned. This measure was meant to relieve the infrastructure there and to improve the chance for the integration of foreigners already living there. A thorough discussion on that issue took place, considering also regional planning aspects. Its effect remained disputed, inasmuch as the discontinuation of recruitment in non-European Community countries, introduced as early as 1974 as a result of economic development, has already reduced the real migration pressure. Meanwhile, the halt of immigration was sus-

pended again, following the large population losses in core cities. Fears of overburdening the infrastructure were replaced by fears of threatening under-utilization. This example clearly demonstrates the instrumental character of a "regional population policy", namely, some particular population distributions should be prevented in order not to endanger other objectives. For instance, an attempt was made to improve the availability of infrastructure not by increasing the supply of infrastructure, but by reducing the population size.

It is true that there is a number of measures that directly or indirectly influence population dynamics and distribution. These measures, however, are neither motivated by population policy nor can they be coordinated into one homogenous system of population policy.

5.1. Population in the Goal System of Regional Planning

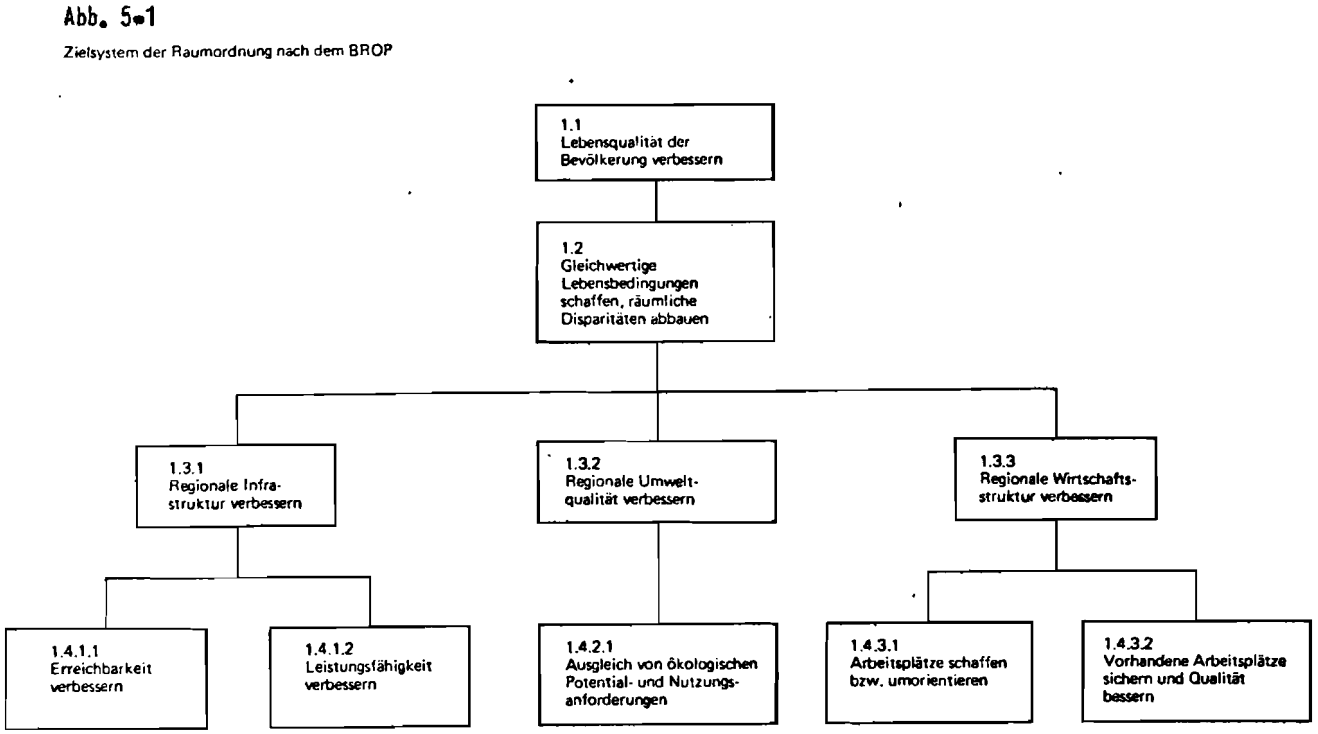
In the Regional Planning Program the objectives relevant to people - such as planning for the population - are given priority. Regional planning is thus meant to contribute to the improvement in the quality of life (BROP, 1975, p.6). The major objective of regional planning is the creation of equal living conditions in all districts of the state, i.e. the reduction of spatial disparities.

This objective should be reached in three areas:
- improvement of infrastructure,
- improvement of employment and economic structure;
- improvement of environmental quality.

In order to improve the supply of infrastructure for the population, the supply and increase of the efficiency of infrastructure already existing are to be raised, on the one hand, and the accessibility of these facilities be increased on the other hand. In order to improve the economic structure of certain areas, additional qualified jobs must be created and those existing must be protected and improved in quality. The quality of the environment, in much congested areas, is to be reached by

a harmonization between utilization of the area and its ecological potential (Fig. 5-1).

Figure 5-1. Goal system of regional planning following BROP.

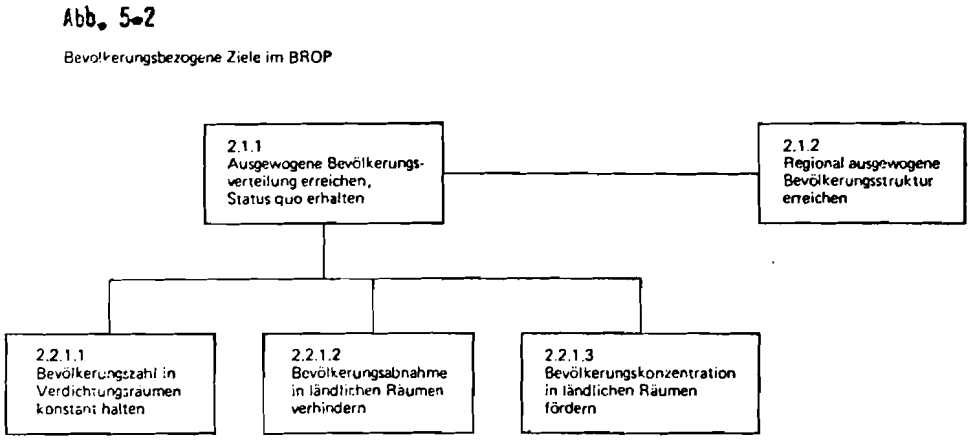


From this system of objectives neither the necessity for influencing the population distribution nor statements about it can be derived.

The statements of the objectives of population distribution and dynamics in the BROP are largely isolated from the regional planning system and its objectives. They are allocated to single areal categories and sub-areas without quantification (Fig. 5).

For example, should out-migration from rural areas be prevented or should the increase of population in agglomerations be stopped, insofar "as this would lead to a reduction of the development potential in weakly structured areas or inasmuch as the quality of living conditions in agglomerations would be affected" (BROP, 1975, p.10). No explanation for these objectives is given

Figure 5-2. Population related objectives in BROP.



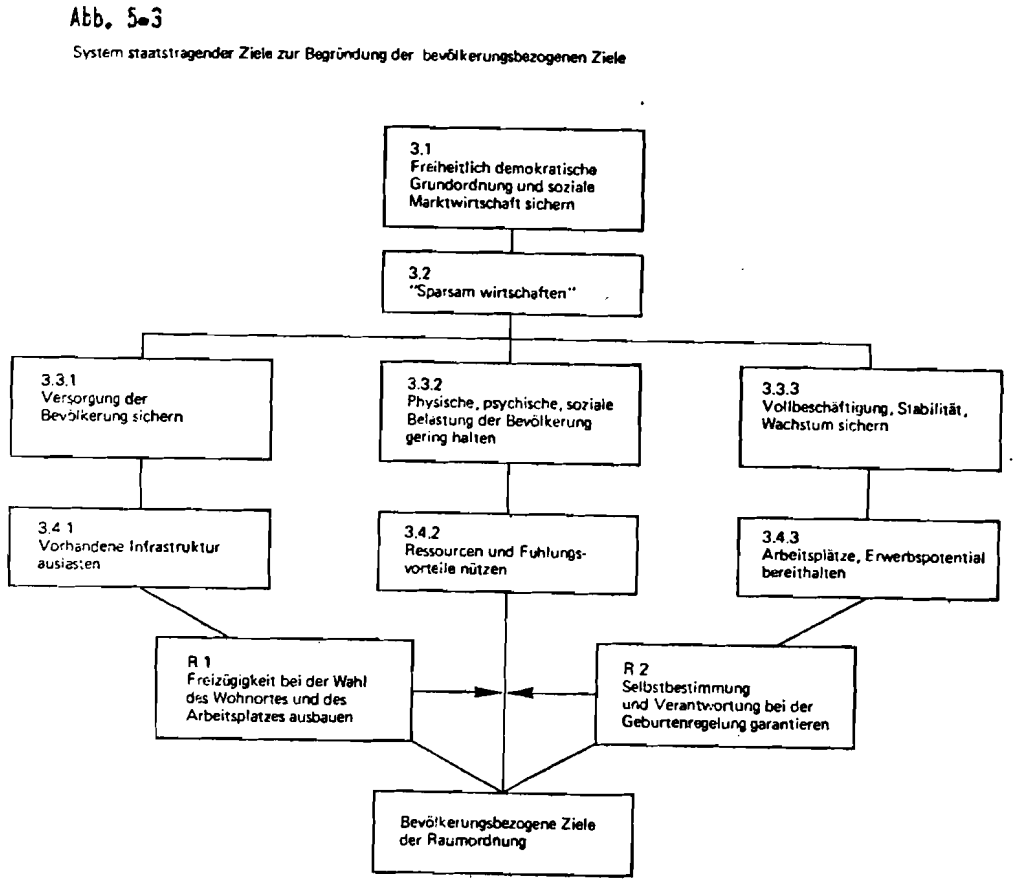
or even tried. And there seems to be no reason for these objectives at first sight. At least, there is no basis for them in the Constitution, other than, e.g., for the objective of the equality of living conditions in Art. 72(2)GG. How can BROP make such statements about objectives for a certain population distribution ?

5.2. State-supportive Objectives and the Derivation of Population-Relevant Objectives

Parallel to the system of objectives in the BROP, a system of so-called system-objectives, i.e. state-relevant, global objectives can be developed (Fig. 5-3). This system of objectives, like the first one, can be based on the Constitution. Although, it is meant to strengthen the "population-relevant system of objectives", however, it frequently competes with it.

Of equal or even more importance than the socio-political principle of "improved quality of life" are the objectives of "securing the liberal-democratic constitution" and "securing the system of social market economy" (Art.20GG, and Art.104aGG).

Figure 5-3. National goals, basis for population related objectives.



Generally, these objectives are realized by socio- and economic-political norms and measures. From the point of view of national economy it is necessary to manage with a minimal investment of resources.

Each regional planning objective can be related to the overall objectives through the use of derived objectives. On this level there will be no conflicting objectives:

- Both under the aspect of minimizing social conflict potential and maximizing the benefits, it seems rational to provide population with sufficient infrastructure and thus improve the chances of every individual.

- the systems objective of "securing growth, full employment and stability" at first sight does not conflict with the objectives of "improving the (regional) economic structure". Both are mutually dependent.

- "Avoiding physical, psychic and social burdens of the population" along with the objective of "improvement of environmental quality" serves the realization of social peace. In addition, the national economy benefits because of better recycling opportunities.

- On the next level of objectives, however, conflicts of objectives between regional planning sub-objectives and systems objectives may occur:

- the sub-objective of "improvement of efficiency of infrastructure" and of "improvement of accessibility of infrastructure provided" are complemented for reasons of costs by the systems objective of "full utilization of existing infrastructure".

- A similar case is given with job creation and improvement a job quality in weakly structured areas. A suitable potential of labor force must be available, resources and incentives must be optimally utilized.

- When the question is raised, whether areas already burdened should be burdened further, the objective of "improving the environmental quality" often is suppressed, since the benefits of the systems objective of "securing growth, full employment and stability" is given priority.

5.3. Consequences for Regional Population Policy

In all of the three partial objectives finally the question arises, whether, instead of investing costly measures, it would not be (cost)-beneficial to direct the population figures and distribution in a suitable manner, i.e. setting up a regional population policy. Such regional population policy, however, is severely limited: the right for free development of the personality (Art.2GG) ensures the free decision of parents about the number and spacing of their children. The right of free mobility ensures all German citizens to choose their own location and employment.

This leads to two consequences for the population within the system of objectives in regional planning:

1) Purely population policy objectives do not exist. A population, large or small, is no value in itself. The population structure, its dynamics and distribution can be evaluated only in comparison with other objectives.

2) The population's relevant objectives and measures therefore must be analyzed according to the objectives they actually serve, and whether they are within the framework that guarantees the full rights of free development of the personality and of movement.

Thus the objective to prevent out-migration from rural areas and its subsequent measures is justified only as long as it contributes to improve the right of movement. This means the increase of options and alternatives and the reduction of certain pressures on mobility (see RON, 1974, p.37). Measures, that do not conform to that must be renounced, even if they help realizing the population's relevant objective and the objectives behind it (such as full utilization of existing infrastructure).

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