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MIGRATION AND SETTLEMENT PATTERNS IN SWEDEN: Description, Explanation and Policy

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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 at IIASA in September 1978.

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

Frans Willekens
Leader, Migration
and Settlement
Task

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1. INTRODUCTION

1.1 *Population policies in Sweden - A historical outlook*

Sweden is fortunate to have some very long time series on most aspects of population development. It is not only true at the level of classical demographic data, but the data also extend to some extent to the spatial dimension. The development of the Swedish population and the policies related to population size and structure can be subdivided into six historical stages. These are:

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

At the middle of the eighteenth century Sweden had a very small population of less than 1.8 million inhabitants. This means that there were only slightly over 4 inhabitants per square kilometre of total land area. As will be shown below the population was very unevenly distributed. The economists and politicians of the time held the mercantilist view that an increase in the population would increase the resources of the country. Such resources were assumed

to have two major uses. They could either be used for the production of goods, preferably export goods, or as an asset in the armed forces. The role of population increase for the military services was the major reason for the secrecy of the population censuses in the eighteenth century.

The mercantilist attitude was also reflected in the anti-migration laws which were in rule until 1860. Quite consistently the authorities encouraged immigration, especially of specialist workers for the newly created manufacturies. Other policies were also changed in the eighteenth century with the explicit goal of favoring population growth.

The whole attitude to the population issue was changed around the middle of the nineteenth century. The former mercantilist orientation of population and economic policies was transformed into liberal-oriented industrial and migration laws. A fairly strict regulation of investment and establishment of firms was changed into a system of modern principles of free entry and exit into the market. Population policies were also changed in a way consistent with the liberal principles of economic policies. Immigration and emigration laws and regulations were abolished and substituted with a principle of free exchange of people with other countries. Foreigners emigrating to Sweden re-

quired neither passport nor residence or work permit. This freedom of movement coincided with other factors that furthered the great emigration from Sweden to the U.S. in the period 1860-1914. At the peak decade (1881-1890) the emigration amounted to approximately 8 persons per 1000 inhabitants. But the liberal migration policy also implied a significant rise in immigration. In the first decade of the twentieth century a reaction against migration emerged and anti-emigration as well as anti-immigration policies were adopted by the parliament. Passports were reintroduced in 1917 and a number of legal actions against labor mobility were introduced in the 1920s. The new legislation against population mobility related to unemployment, the housing situation, law and order but to some extent also to racial considerations.

The discussion on population development in terms of size and structure was changed completely with the advent of the book "Crisis in the population issue" by Alva and Gunnar Myrdal, published in 1934. They pointed to the decrease in fertility and its relation to the social and economic situation of families in Sweden of the 1930s. A National Population Commission was set up to construct a new population policy. The first laws were related to health services for mothers and infants. The first Population Commission was soon followed by a second and extended

Commission on Population Policy. The second commission formulated a general population and social policy comprising questions of abortion, housing subsidies, provision of school meals and child allowances.

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

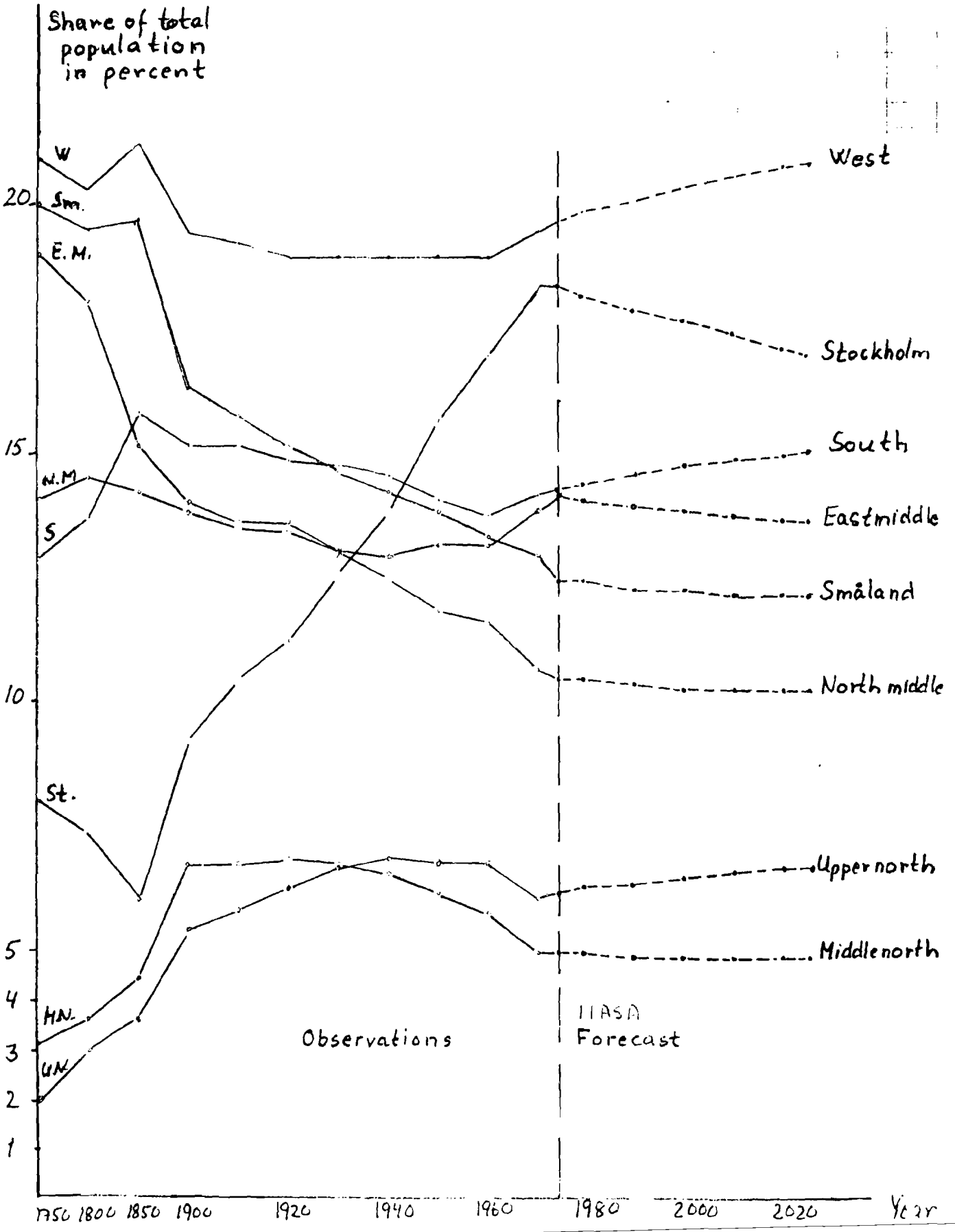
1.2 *The historical settlement pattern of Sweden 1750-1975*

The Swedish population distribution in space is documented for a period since 1750. Such population distribution statistics are presented below in figure 1. We have chosen to use subdivision of the country into 8 macro-regions aggregated from data on the 24 counties.

On the basis of figure 1 the following observations about the settlement pattern in Sweden can be made:

a. The Stockholm region has been increasing its relative share of the total population at a steady rate from

Figure 1 Population distribution in Sweden 1750-1974 and forecast to 2024



1850 to 1970. This steady rate of growth was broken by a period of stagnation starting around 1970.

b. The counties of the periphery (Upper and Middle north) also have shown a remarkable increase in their share of approximately 5 percent around 1750. They increased to 8 percent around 1850 and had a peak of 12.8 percent in 1950. Since then the relative share has decreased and in 1970 it was slightly less than 11 percent of the total population.

c. The most stable parts of the country are the southern and the western regions which have had a population share of approximately 14 and 19 percent of the total population for the whole period.

d. The great decline in relative importance is in fact concentrated to all the counties of the eastern and mid-inland parts of the country (Småland, East middle and North middle). Those areas had around 53 percent of the total population in 1750. A figure that had decreased to 44 percent by 1900 and was down at 37 percent by 1970.

The long term movement seems to be from the inland to the coastal areas with some concentration to the metropolitan region of Stockholm. In a historical perspective there has

been no real increase in the relative population shares of the Göteborg and Malmö metropolitan regions. The development of the settlement pattern has been accompanied by significant changes in population densities and in the regional income distribution. The development of the population density in the county regions is given in figure 2 and the change in income shares is given for the period 1920-1975 in figure 3.

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

To illustrate these changes mainly two levels of geographical aggregation are relevant. The first one is related to the so called A-regions introduced as part of the labor market policy organization by the end of the 1950s. Those regions are defined to be "commuting regions" for users of labor

Figure 2 Density of population in the county regions

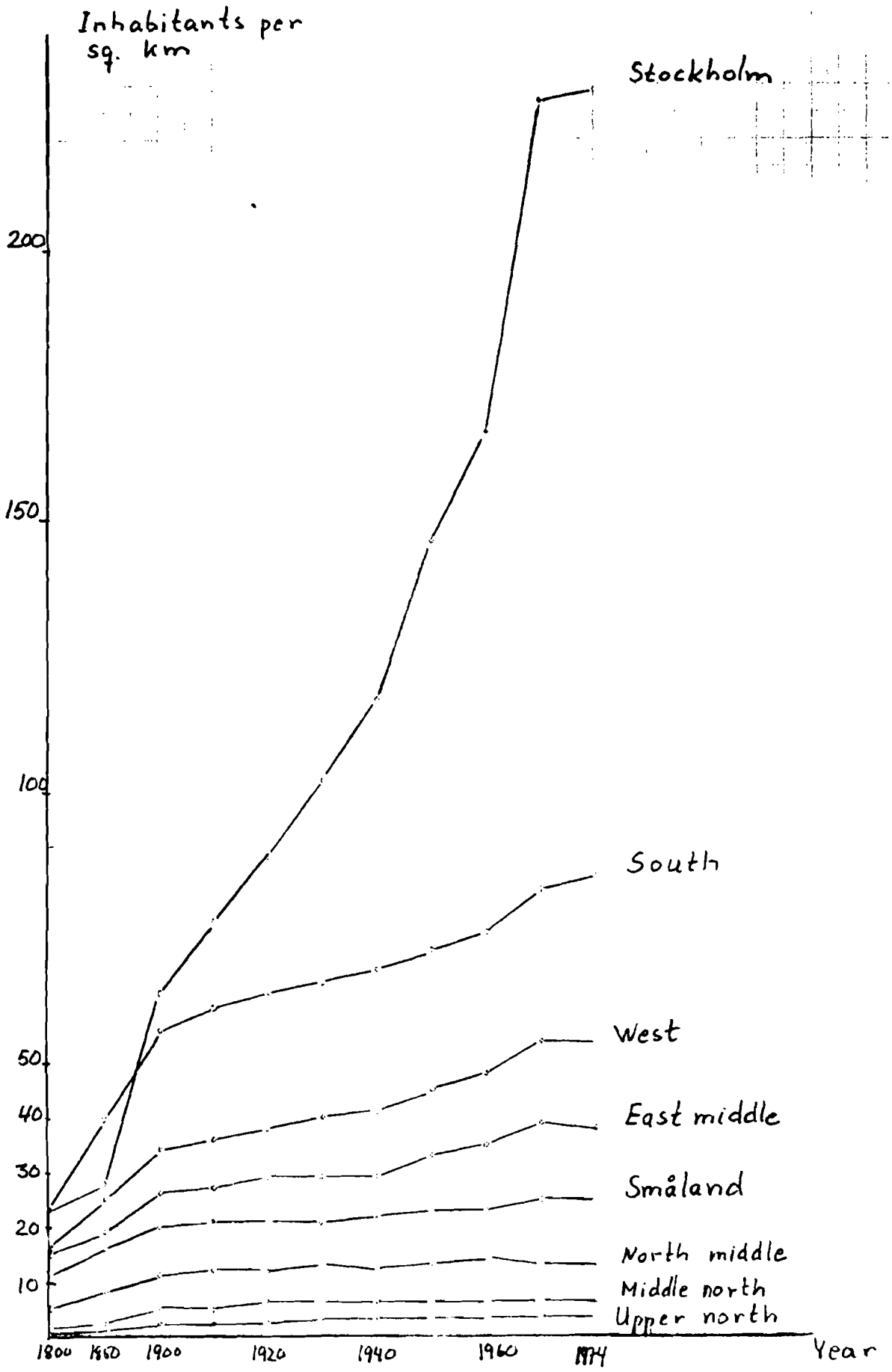
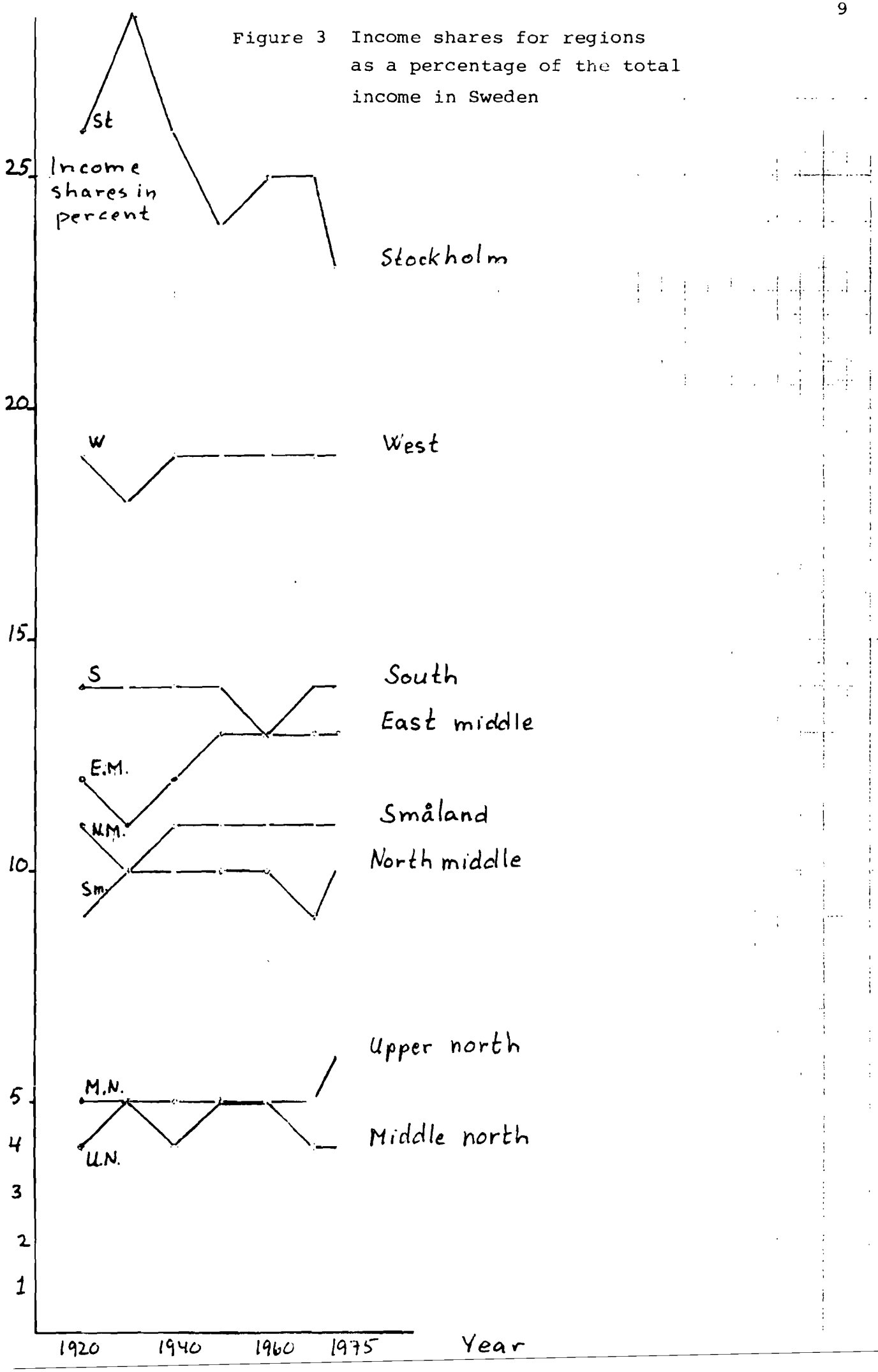


Figure 3 Income shares for regions as a percentage of the total income in Sweden



and services. There are in Sweden 70 such A-regions with an average population of 120 000 inhabitants. The variation in size, however, is very large and it turns out to follow the well-known rank size rule in a fairly accurate way. The development of the rank size rule for these regions is given for the period 1965-1975 in the figure 4 below. The most significant changes are indicated by symbols with an explanation below the figure.

Population information is also available for localities, defined as agglomerations with more than 200 persons in a contiguous location. Contiguity means that a person who lives more than 200 meter from his nearest neighbour is not included in the locality. Some exceptions to this rule have been used, especially in the larger localities where actual influences have been observed to be larger than 200 meters.

The proportion of the population living in localities is now more than 82 percent, which implies that the internal size distribution of population by localities is of importance. The evolution of the relative importance of localities of different size is given in table 1.

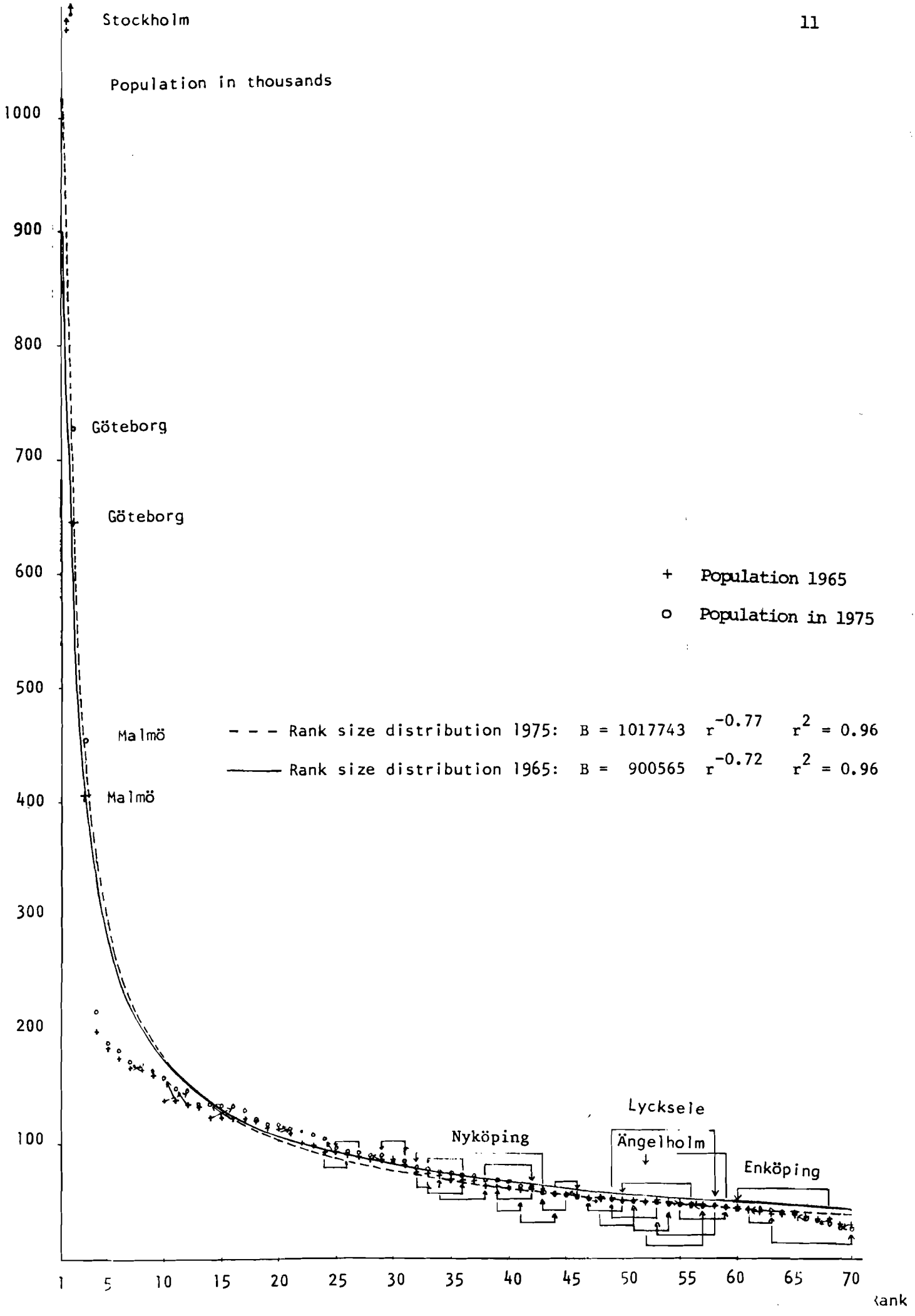

Stockholm
Population in thousands
1000
900
800
700
600
500
400
300
200
100
Göteborg
Göteborg
Malmö
Malmö
+ Population 1965
o Population in 1975
- - - Rank size distribution 1975: B = 1017743 r^-0.77 r^2 = 0.96
——— Rank size distribution 1965: B = 900565 r^-0.72 r^2 = 0.96
Lycksele
Nyköping
Ängelholm
Enköping
1
5
10
15
20
25
30
35
40
45
50
55
60
65
70
Rank

Table 1 Number of localities by size of population 1950, 1960, 1970 and 1975

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

[x] Number of localities in 1975 divided by the number in 1950

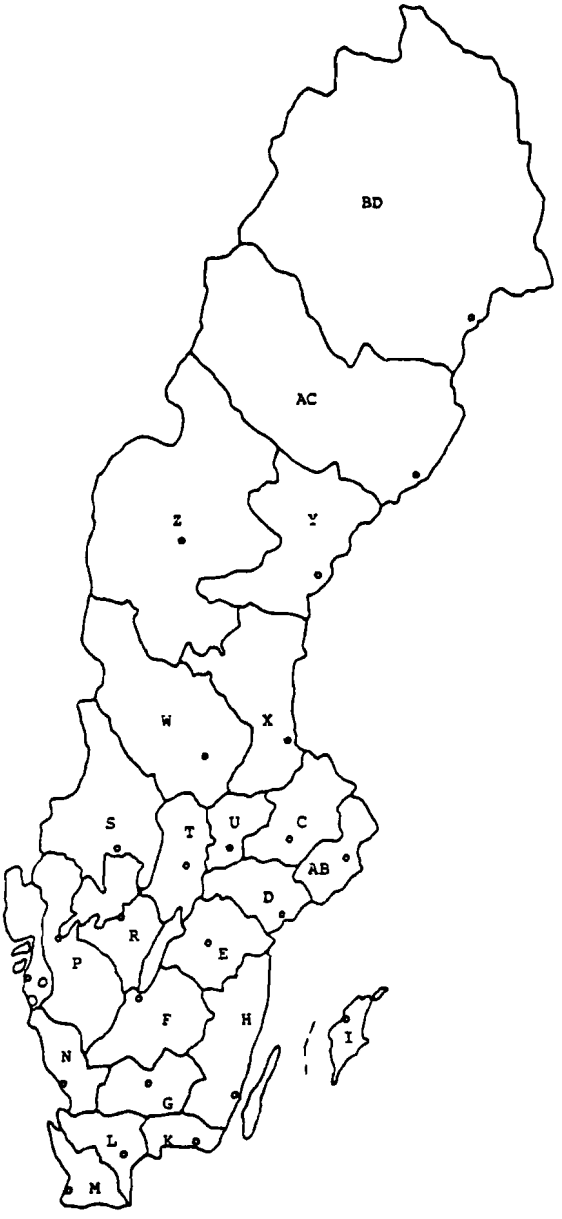
The number of localities with less than 2000 inhabitants have decreased with the strongest decrease in the smallest size group. All the size classes above and including 2000 inhabitants have increased rather rapidly, with a peak in the increase of the localities of 50 000 - 100 000 inhabitants.

2. CURRENT PATTERN OF SPATIAL POPULATION GROWTH

2.1 *Regional disaggregation and aggregation*

The Swedish population registration system is based on the parish as the smallest geographical unit. With the parish as primary element a large number of regional systems may be constructed. In administrative contexts the commune is the basic unit and since there are 2570 parishes and 278 communes there are between 9 and 10 parishes in each commune at an average. The communes may be further aggregated to the 70 A-regions mentioned in the previous section or to 24 counties (see figure 5 and 6).

The various administrative regions mentioned above are not well suited for demographic analysis and it would be surprising if they were. The only exception is the system of A-regions which were constructed to represent local labor markets and variations in the labor market are closely related to migratory movements. Therefore, a regional system based on labor market regions would be a valuable basis for the study of internal migration. On the other hand, such a large number of regions may be difficult to handle in a demographic analysis. Several attempts have been made to construct other regional systems more suitable for demographic analysis. These regional systems were designed to be

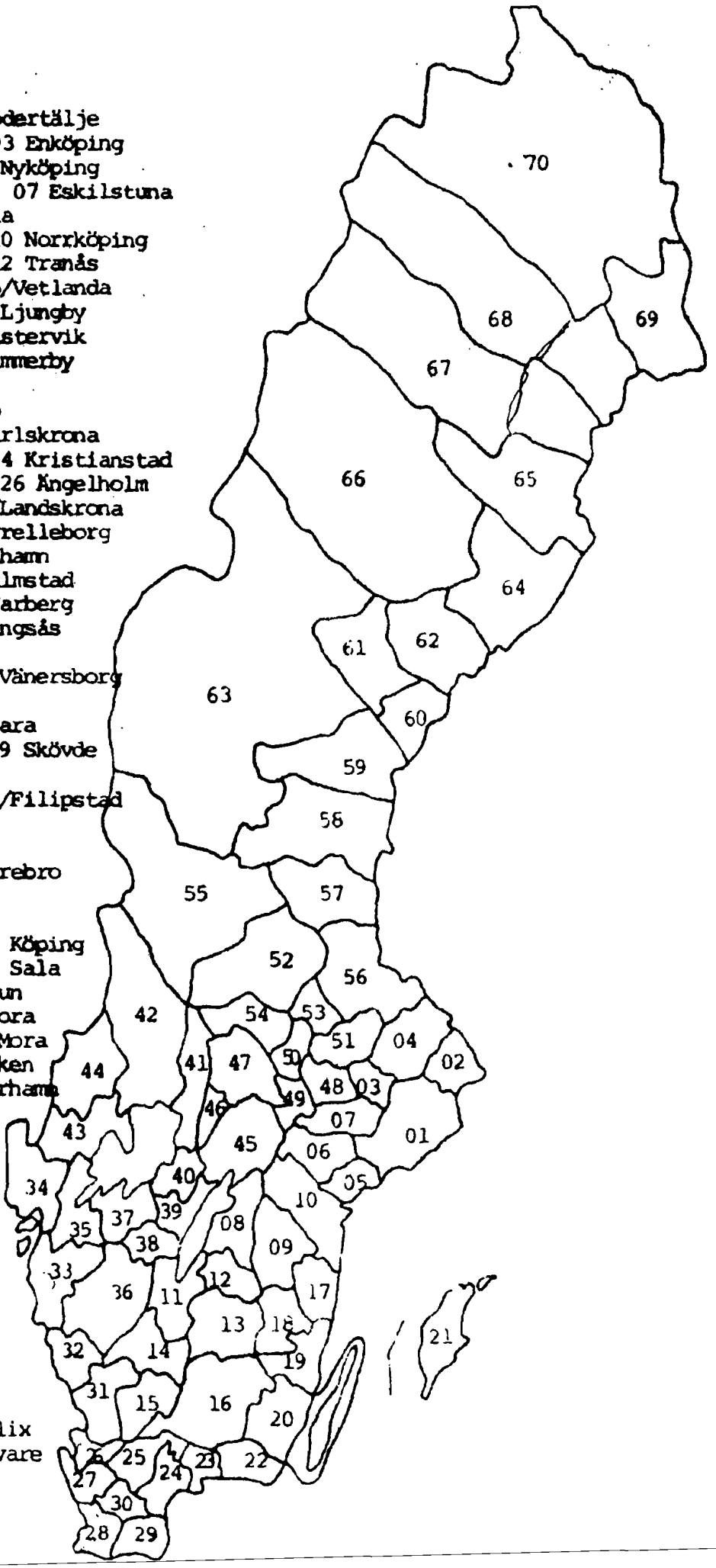


Name of County
AB Stockholm
C Uppsala
D Södermanland
E Östergötland
F Jönköping
G Kronoberg
H Kalmar
I Gotland
K Blekinge
L Kristianstad
M Malmöhus
N Halland
O Göteborgs och Bohus
P Älvsborg
R Skaraborg
S Värmland
T Örebro
U Västmanland
W Kopparberg
X Gävleborg
Y Västernorrland
Z Jämtland
AC Västerbotten
BD Norrbotten

Figure 6

A-regions

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



used for studying fertility, mortality and migration.

In a study of regional variations in fertility in Sweden 1968-1973 a regional system comprising 117 fertility regions was constructed with communes as building stones. The following conditions governed the construction of the regions: contiguous communes, similar level of urbanization, similar economic structure and migration pattern and similar levels of economic activity rates for women. Most of the communes were included in regions comprising 2-3 communes; 38 of the largest communes formed regions of their own. One of the leading principles in the construction of these regions have been to attain a sufficiently large population for the calculation of age specific fertility rates.

Regional variations in mortality have been studied on several occasions in Sweden. In a study 1976, attempts were made to construct mortality regions on the basis of the counties. For the males four distinct clusters could be separated: the first cluster comprised counties in southern and western Sweden, the second cluster counties in middle Sweden, the third cluster included the metropolitan counties and the two morthernmost counties and finally, the fourth cluster which only comprised three counties in the south-eastern part of the country.

The regional variation in female mortality was much less pronounced and the clusters were more homogeneous. An aggregation to 5 clusters is described in the following way: the first cluster is formed by the two largest metropolitan counties, Stockholm and Göteborg, the second cluster includes the two northern counties, the third cluster is formed by the counties in southern Sweden and the fourth and the fifth cluster comprises counties in central Sweden.

The most important conclusion to be drawn from the study was,that there exists a distinct pattern in the regional variation in mortality. The conclusion lead to the start of a more comprehensive study of the regional mortality including a construction of a consistent regional system for mortality studies. In this study, which was carried out at the Central Bureau of Statistics, communes and A-regions were used as primary units.
The study, which will be published in the series of Forecasting Information from the Forecasting Institute at the National Central Bureau of Statistics within shortly, reveals a very complicated structure in the regional mortality variation.

The third attempt to construct a regional system was initiated by a study of internal migration. Preliminary

estimations of migration equations appeared to have a very distinct spatial structure. It was therefore considered necessary to determine whether the country could be regarded as homogeneous with respect to the determinants of migration. A subdivision of the country in different clusters in which the migration behaviour is homogeneous and separated from the rest of the country may be motivated primarily by the upgrowth of spatial regions with very high information density. Because of this a number of cluster studies were carried out on the Swedish A-regions. The purpose of the studies was to see whether regions with a similar distribution of outmigration and inmigration were linked together in any apparent spatial pattern. As a criterion of the difference between A-regions with respect to the destination of their migration a χ^2-measure was used. This measure expresses the deviation between observed and expected frequences for each pair of rows in the migration matrix. The expected frequences are calculated on the basis of a hypothesis of a uniform distribution with fixed marginal distributions.

A cluster analysis is designed so as to aggregate elements for which there are observations on a number of variables. The observation in this case were each one of the 70 A-regions regarded as elements and inmigration from the remaining 69 regions to a given region as a vector of variables; the

total inmigration to the given region is regarded as the 70th variable. The results are presented in figure 7, where seven clusters of A-regions are distinguished.

A first crude subdivision of the country gives two main regions. The northern region can be further divided into two subregions and the southern main region into four subregions.

Since the migration matrix is symmetric, we may reasonably assume that the transposed migration matrix also may be of interest. In this case the regions are clustered with respect to destination of their outmigration.

The result is shown in figure 8 and only some minor differences in comparison with the above analysis are revealed. The two main regions are divided into six subregions of which two are found in the northern main region.

The purpose of the cluster analysis was to establish whether regional migration in the country shows any specific patterns and also if it was possible to form large contiguous regions that are homogeneous with respect to regional migration.

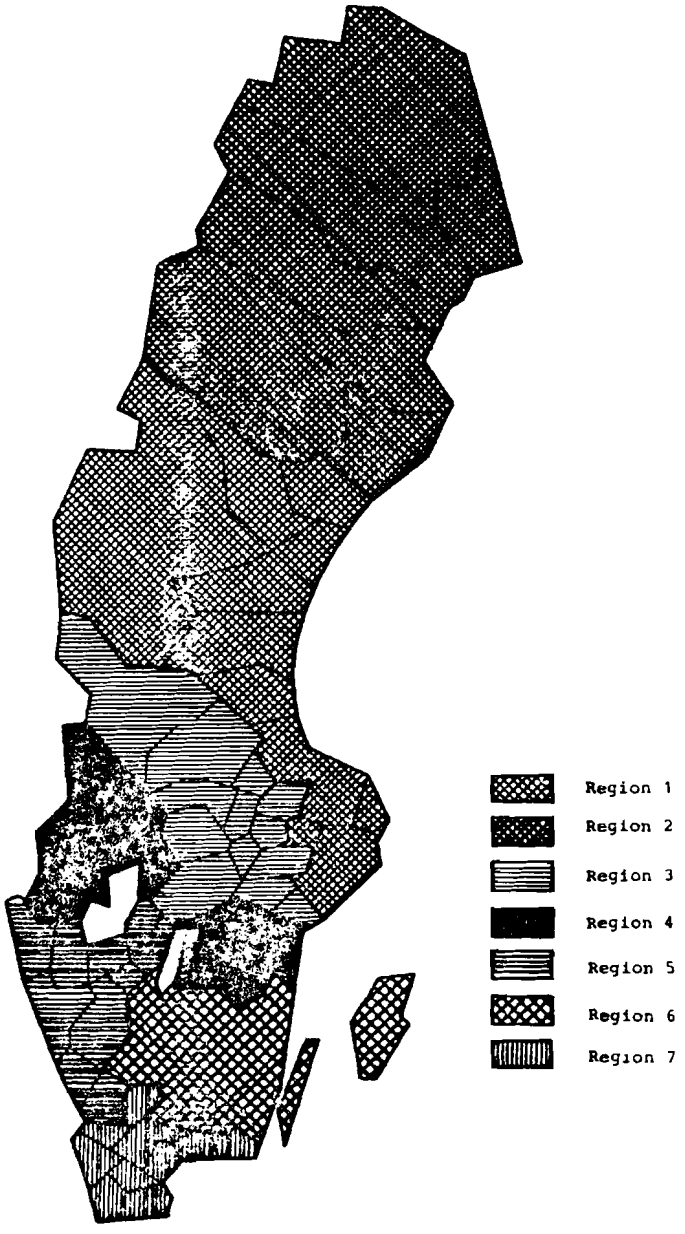


Figure 7 : Migration by Origin

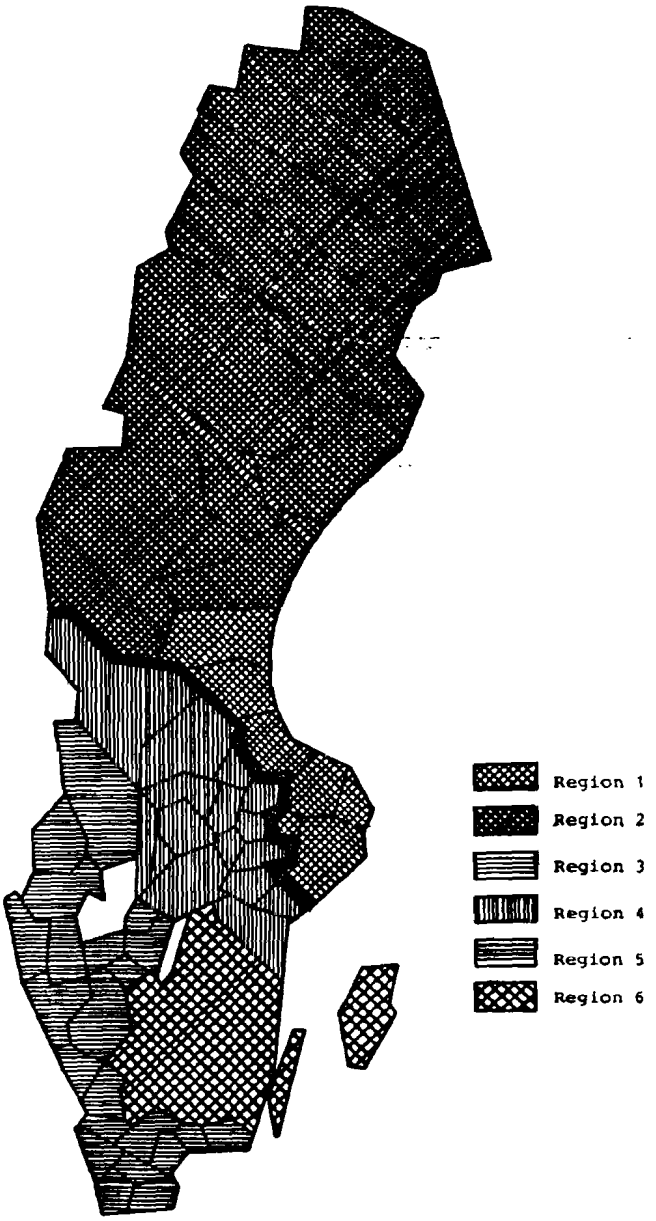


Figure 8: Migration by Destination

In this perspective the analysis did not reveal any extra-ordinary results. On the other hand, a close correspondence was found to exist between the systems of region obtained either by considering similarities in the migration flows by origin or by destination; there is only one exception from this general rule.

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

The regional system employed in the present study is similar to the above system of M-regions in several aspects, although it is more closely related to a system of county regions sometimes used in regional analysis or in the presentation of regional economic and demographic data. Table 2 below gives an overview of the relation between the three systems.

Table 2 Comparison of three different regional systems: the M-regions, the County regions and the CMS Study regions

CMS	Study region	County region		M-region	
1	Stockholm	1	AB	1	Stockholm (adding A-region 02)
2	East middle	2	CDETU (excepting T county)		------
3	Småland	3	FGHI (adding T county)	5	Småland (adding U county)
4	South	4	KLM	6	Southern Sweden (excepting Malmö A-region)
5	West	5	NOPR	7	Western Sweden (excepting A-regions 43 and 44 in P county)
6	North middle	6	SWX	8	South-west inland (adding W and X counties and excepting part of P county)
7	Middle north	7	YZ	11	Middle north inland (adding Y county)
8	Upper north	8	ACBD	12	Upper north inland
				13	Upper north coastal area
	---------		--------	2	Göteborg A-region
	---------		--------	3	Malmö A-region
	---------		--------	4	South-east coastal area
	---------		--------	9	Central Sweden
	---------		--------	10	Middle north coastal area

2.2 *Regional demographic data*

Fertility

The analysis of regional variations in fertility carried out at the Forecasting Institute for the period 1968-1973 gave as a result a fairly complicated pattern. Regions with a high fertility were concentrated in the western part of the country while regions in northern Sweden generally had the lowest fertility. The Stockholm region stands out as being the most heterogeneous region in this respect. The central part of the region (the Stockholm commune) has the lowest fertility level in the country while 3 suburban communes in the region have the highest level.

Fertility development during the period varied in the regions. The regions with a high fertility during the first part of the period showed a steeper fall during the later part of the period than those with a lower level. During the period 1968-1973 regional differences in fertility was smoothed out to some extent.

Not only the level of fertility varied between regions, but also the structure varied. For the southern part of the country it can be said that the further east one comes the lower becomes the fertility for women over the age of 30,

while, on the other hand, the fertility of younger women is higher in the eastern part than in the western part of that province. In the middle parts of the country the downward movement of childbirth into younger age groups has become most prevalent. In the northern-most part of the country fertility was still relatively high for women over the age of 30, while fertility for women under the age of 30 was low.

In a preliminary study with data from the Jönköping county in the southern part of the country a number of economic factors were analyzed with respect to their relation to a fertility measure. In a regression analysis with all women considered as one single group, the relation to economic variables tended to be fairly weak. It could be suspected, however, that the very strong positive relation with marital status and age as explanatory variables and the number of children tended to obscure possible influences of socio-economic variables on fertility as measured in the above way. Therefore, a new set of regression equations were estimated separately for all women and for married women distributed by age in (5-year) age classes (20-24,... 35-39 years).

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

Education was also a factor with negative influence on fertility.

The result of this preliminary analysis pointed to the importance of including differences in social variables between different regional environments in further studies of regional variations in fertility. Changes in background variables may have a considerable influence on the future development of fertility within regions. In the present study specific fertility data are used for each region. The difference in level between the regions is seen from table 3 below. The variations in the total fertility rate reflect to some extent the variations accounted for in the previous mentioned study by the Forecasting Institute.

Table 3 Total fertility rates and mean expectations of life at birth in the study regions 1974

Region	Total fertility rate	Mean expectation of life at birth	
		Males	Females
Stockholm	1.71	72.32	78.20
East middle	1.93	72.30	78.22
Småland	1.99	72.38	78.12
South	1.90	72.77	78.52
West	1.92	72.45	78.40
North middle	1.88	71.97	78.05
Middle north	1.92	71.96	77.76
Upper north	2.01	72.21	78.07

Mortality

The regional variation in mortality is being studied at the Forecasting Institute and a report is due to appear within shortly. Without forestalling this investigation it can be said that there exists a large difference in mortality already at he county level. A calculation of life tables for counties for the period 1966-1970 reveals a considerable span in the mean expectations. For males the lowest value was 70.57 years (Stockholm county) and highest value was 73.47 years (Kristianstad county in southern Sweden); a difference amounting to about 3 years. A corresponding variation for females was 75.79 years (Värmland county in the west inlands of Sweden) to 78.11 years (Kristianstad county).

The factors causing these variations have been analyzed only in a very crude way. Preliminary analysis places the heaviest weight on factors associated with industry and urbanization. For a more detailed analysis a much more detailed regional system is required as e.g. in the study at the Forecasting Institute mentioned above.

For obvious reasons most of the variation is levelled out when regions are aggregated as in this study. Nevertheless, a certain amount of variation still remains as is seen from

table 3. Another reason for a smaller range in the mean expectationsis the smoothing effect of migration. Because of migration newborn children spend only between 30-40 years in their region of birth; according to the hypothesis employed in this analysis, people who migrate attain the mortality level in the region of their destination.

Migration

The age distribution of migration has a very distinct pattern common to many counties (see for example Rogers et.al. 1977). The migration probabilities for the whole country is shown in figure 9. Apart from random fluctuations this figure may be taken to represent all counties in Sweden.

The model also requires data on migration from a given region to each one of the remaining regions. A gross migration matrix is given in Table 4. Both men and women have a very similar distribution over regions in their migration. The table also shows that a large proportion of all migration is concentrated to destinations that are close to the home region. The Stockholm region is an exception from this rule since the migration from this region is distributed more evenly over the remaining regions. The two northern regions are at the opposite extreme with over 30 percent of the migration directed towards the Stockholm region and

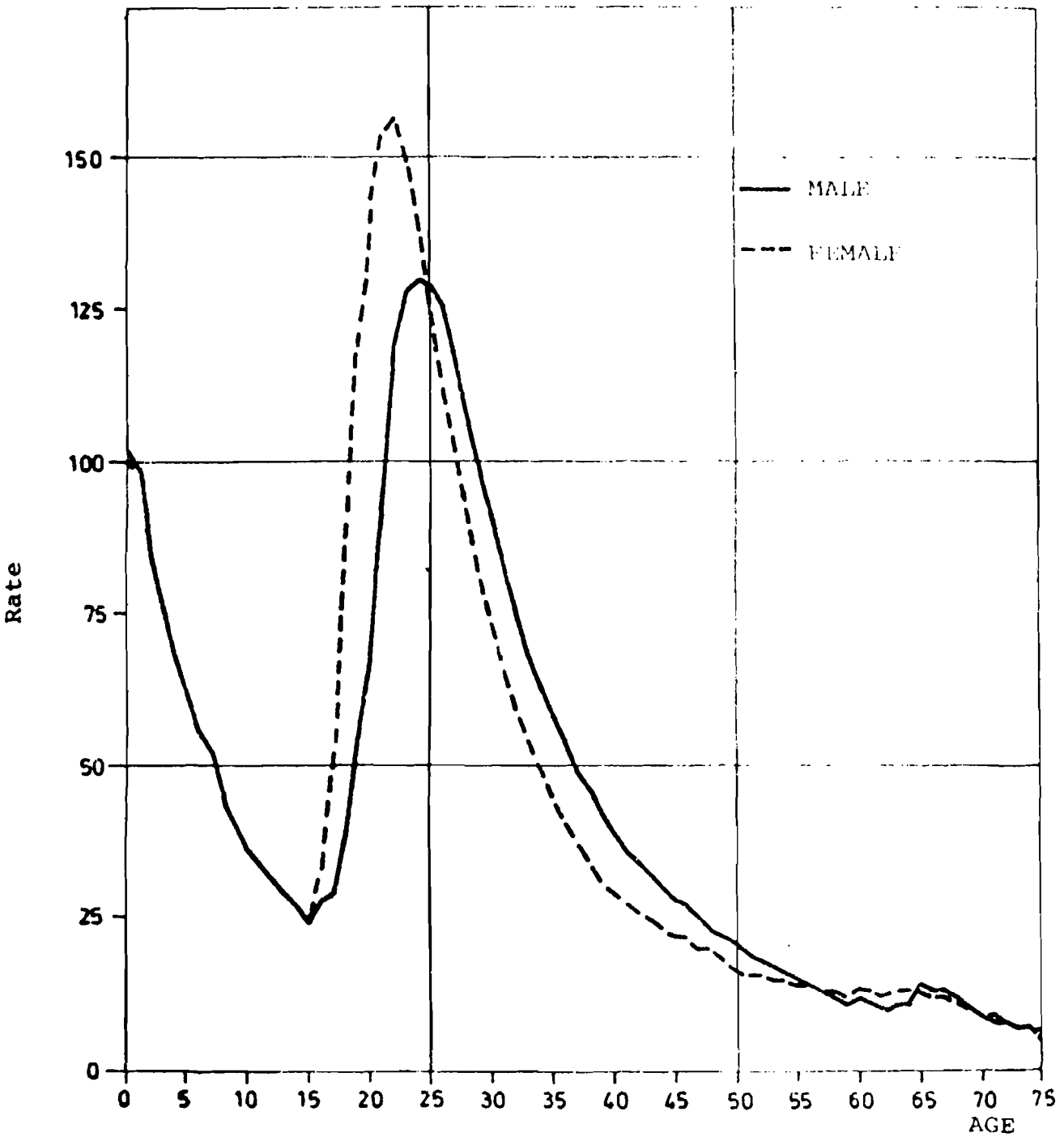


Figure 9 Age-specific annual migration rates by sex; average for the period 1968 - 1973

only between 15 or 16 percent of the migration goes to the nearest region.

There is a tendency for females moving from the two northern regions, to choose the highly urbanized Stockholm region as their migration destination. Males, on the other hand, seem to be more tied to regions close to their home region.

In the age-group 20-24 years (see table 5) this tendency becomes even more pronounced for both sexes. Young people in all regions, with a few exceptions only, seem to have a very strong propensity to move to the Stockholm region.

Table 4 Grossmigration matrix. Percentage distribution. All ages.

From		TO Stockholm	East middle	Småland	South	West	North middle	Middle north	Upper north	Total
Stockholm	F	0.0	34.6	9.1	11.4	11.2	16.5	9.1	8.0	100
	M	0.0	34.4	9.4	11.9	11.2	16.1	8.8	8.2	100
East middle	F	32.0	0.0	10.7	10.2	15.9	18.5	5.8	6.9	100
	M	31.2	0.0	10.7	10.4	16.1	18.6	5.9	7.1	100
Småland	F	16.3	21.4	0.0	26.2	26.6	5.0	1.6	2.8	100
	M	16.9	21.1	0.0	26.1	25.4	5.5	1.8	3.1	100
South	F	21.5	15.5	24.4	0.0	25.8	6.4	2.7	3.8	100
	M	21.3	16.6	23.5	0.0	25.2	6.6	2.8	4.0	100
West	F	18.8	19.5	16.6	21.0	0.0	13.8	4.6	5.7	100
	M	18.0	19.9	16.4	20.4	0.0	14.3	4.7	6.3	100
North middle	F	25.4	32.4	4.6	4.9	19.5	0.0	7.4	5.9	100
	M	23.7	32.2	4.6	5.6	18.7	0.0	8.7	6.5	100
Middle north	F	31.3	18.5	3.5	5.7	11.0	13.6	0.0	16.4	100
	M	28.1	18.8	4.0	6.4	10.6	14.9	0.0	17.2	100
Upper north	F	31.3	22.1	4.7	5.5	11.4	9.9	15.1	0.0	100
	M	26.5	22.5	4.9	6.3	13.0	10.5	16.3	0.0	100

Table 5 Grossmigration matrix. Percentage distribution. Ages 20-24 ages.

From		TO Stockholm	East middle	Småland	South	West	North middle	Middle north	Upper north	Total
Stockholm	F	0.0	34.4	8.3	9.3	11.4	16.3	8.6	11.6	100
	M	0.0	35.2	7.9	12.2	13.6	13.2	7.7	10.2	100
East middle	F	36.1	0.0	10.3	9.3	17.2	16.0	5.0	6.2	100
	M	39.1	0.0	9.0	9.4	16.3	15.5	4.5	6.2	100
Småland	F	16.0	21.9	0.0	26.2	27.0	4.5	1.9	2.4	100
	M	22.1	21.2	0.0	26.2	22.8	4.0	1.4	2.3	100
South	F	21.5	15.7	23.7	0.0	27.6	5.4	2.2	4.0	100
	M	24.2	17.0	25.0	0.0	22.5	5.5	3.0	2.8	100
West	F	19.5	19.8	16.9	21.9	0.0	12.2	4.6	5.2	100
	M	20.5	20.8	15.3	20.5	0.0	13.1	4.2	5.6	100
North middle	F	30.4	31.9	2.8	3.8	20.7	0.0	5.9	4.5	100
	M	30.1	32.6	2.0	4.4	19.3	0.0	7.4	4.4	100
Middle north	F	38.8	19.0	2.3	5.4	9.2	11.6	0.0	14.0	100
	M	35.0	20.2	3.0	5.6	11.8	12.6	0.0	11.8	100
Upper north	F	37.2	20.9	2.6	5.8	12.1	7.0	14.4	0.0	100
	M	36.0	22.3	2.7	5.4	12.5	8.0	13.1	0.0	100

3. MULTIREGIONAL POPULATION ANALYSIS

The stable population model is based on the assumptions of constant fertility and mortality. Furthermore, the population is assumed to be closed to external migration and demographic development takes place for male and females independently of each other. The last assumption implies that the analysis can be limited to one sex only; usually the female sex because women have a more exactly defined fertile period. Classical demographic analysis was only interested in the development of population over time and the spatial aspect was not included. On the contrary, spatial and also social mobility have been in the focus of interest mainly for geographers and sociologists. During recent years there has been a rising interest from demographers to formulate a regional version of the stable population model. Originally, Lotka formulated his stable population model in continuous terms. The basis for the regional stable population model is a discrete formulation as suggested by Bernadelli and in a more elaborate way by Lesley (1945). By introducing a matrix operator, the stable conditions are derived through a series of projections. Theoretically the results are exactly analogous to each other but the discrete approach has certain advantages, especially today when large computers can be used for the calculations.

Formulated as a discrete matrix model the one-region stable population model is easily expanded to a larger number of regions; the number of region is mainly limited by the capacity of the computer. The assumptions underlying this model are the same as those on which the one region stable model is based. In the k-region model the population is closed against external migration but migration between the regions within the model is permitted. Under these assumptions the population will have a development such that each region and each age group will attain a constant share of the total population. In the following sections these properties will be further investigated.

3.1 *The multiregional life table*

The multiregional life table summarizes the effect of both mortality and mobility. The total life time of an individual is distributed over all the regions included in the model. In this way it is possible to see how many years a newborn child will spend in each one of the regions. The number of years spent thus depends on both mortality of the various regions and the mobility pattern. According to the hypothesis a person who moves into a region acquires the mortality prevailing in that region. In table 6 mean expectations of life at various ages are presented. The total mean expectation is split into number of years spent in each one of the eight regions. In the region East middle (which happens to be the

Table 6 Mean expectation of life at birth for females at the ages 0, 20 and 35 years by initial region of cohort. Percentage distribution

Initial region of cohort	Age	Total years	Region of Residence: Stockholm	East middle	Småland	South	West	North middle	Middle north	Upper north	Total
Stockholm	0	78.20	50.3	12.6	5.4	6.9	8.4	8.0	4.1	4.2	100
	20	59.08	40.7	14.6	6.6	8.4	10.3	9.4	4.9	5.1	100
	35	44.49	36.8	15.1	7.1	9.2	11.2	10.1	5.2	5.4	100
East middle	0	78.22	15.4	42.1	6.7	7.5	11.1	9.4	3.6	4.3	100
	20	59.10	18.4	30.6	8.0	9.2	13.5	11.0	4.3	5.1	100
	35	44.49	18.6	27.2	8.5	9.9	14.3	11.5	4.6	5.3	100
Småland	0	78.12	7.8	7.7	55.3	10.5	11.8	3.6	1.4	1.9	100
	20	59.23	9.7	9.3	45.0	13.0	14.4	4.5	1.8	2.3	100
	35	44.59	10.2	9.7	41.5	13.8	15.2	5.0	2.0	2.6	100
South	0	78.52	7.6	5.7	7.8	62.5	9.8	3.3	1.5	1.8	100
	20	59.40	9.4	7.1	9.5	53.8	12.1	4.1	1.8	2.3	100
	35	44.77	9.9	7.6	10.0	50.4	13.0	4.6	2.0	2.5	100
West	0	78.40	7.3	6.5	5.8	7.5	63.6	4.9	2.0	2.4	100
	20	59.31	9.0	7.9	7.1	9.3	55.5	6.0	2.4	2.9	100
	35	44.68	9.5	8.4	7.6	10.1	52.2	6.5	2.6	3.1	100
North middle	0	78.05	12.2	11.9	4.0	4.7	10.9	49.1	3.5	3.6	100
	20	58.94	15.3	14.2	4.9	6.0	13.5	37.5	4.3	4.3	100
	35	44.37	15.5	14.6	5.5	6.7	14.2	34.3	4.6	4.6	100
Middle north	0	77.76	14.5	9.5	3.6	5.1	8.4	7.3	44.5	7.1	100
	20	58.97	18.0	11.6	4.6	6.4	10.5	8.9	31.7	8.3	100
	35	44.32	18.0	12.1	5.0	7.1	11.2	9.5	28.4	8.6	100
Upper north	0	78.07	13.3	9.4	3.7	4.6	7.6	5.8	5.4	50.2	100
	20	58.95	16.7	11.5	4.6	5.9	9.5	7.2	6.5	38.1	100
	35	44.35	16.7	12.0	5.1	6.5	10.3	7.8	7.0	34.6	100

most mobile region in this respect) a newborn female child will spend 42 percent of her total lifetime in the home region, 15 percent in the Stockholm region, 11 percent in region West, 9 percent in region North middle and so on. In the least mobile region (region West) a newborn female child will spend around 64 percent of her total lifetime in the home region 7 percent in the Stockholm region, 6 percent in region East middle and only 2 percent of her total lifetime in each one of the two northern regions.

The corresponding proportions have also been calculated for the age 20 and 35 years (see table 6). As is seen from the table the share of the total lifetime spent in the region of birth decreases proportionately. For example a female age 20 years, born in region East middle spends about 30 percent of her total remaining lifetime in the home region, 18 percent in the Stockholm region, 13 percent in region West and so on. The corresponding figures for a female, born in the region West are about 55 percent of the remaining lifetime is spent in the region of birth, 9 percent is spent in the Stockholm region, around 8 percent in the region East middle and so on.

At the age of 35 years a further reduction of the total remaining lifetime is observed. The stability of the population in regions West and South is outstanding at

Table 7 Survivorship proportions at age 20 by region of origin and by residence

Region of origin		Region of Residence								
		Total	Stockholm	East middle	Småland	South	West	North middle	Middle north	Upper north
Stockholm	M	0.9957	0.8255	0.0551	0.0146	0.0199	0.0241	0.0249	0.0139	0.0178
	F	0.9978	0.8175	0.0578	0.0155	0.0185	0.0228	0.0302	0.0164	0.0191
East middle	M	0.9947	0.0872	0.7462	0.0246	0.0244	0.0420	0.0403	0.0130	0.0169
	F	0.9979	0.0911	0.7254	0.0283	0.0266	0.0469	0.0450	0.0156	0.0190
Småland	M	0.9948	0.0346	0.0349	0.8239	0.0416	0.0419	0.0087	0.0038	0.0054
	F	0.9979	0.0314	0.0388	0.8119	0.0461	0.0502	0.0097	0.0041	0.0056
South	M	0.9943	0.0313	0.0227	0.0310	0.8556	0.0353	0.0092	0.0038	0.0054
	F	0.9976	0.0330	0.0234	0.0331	0.8474	0.0402	0.0097	0.0039	0.0069
West	M	0.9950	0.0250	0.0248	0.0193	0.0232	0.8717	0.0174	0.0056	0.0080
	F	0.9981	0.0268	0.0262	0.0216	0.0275	0.8639	0.0178	0.0063	0.0080
North middle	M	0.9940	0.0579	0.0632	0.0078	0.0102	0.0400	0.7880	0.0148	0.0120
	F	0.9971	0.0646	0.0686	0.0096	0.0110	0.0478	0.7671	0.0155	0.0129
Middle north	M	0.9945	0.0744	0.0460	0.0085	0.0153	0.0277	0.0297	0.7575	0.0355
	F	0.9983	0.0895	0.0492	0.0085	0.0153	0.0268	0.0320	0.7355	0.0415
Upper north	M	0.9945	0.0583	0.0402	0.0074	0.0120	0.0256	0.0184	0.0258	0.8068
	F	0.9978	0.0686	0.0461	0.0082	0.0137	0.0276	0.0202	0.0311	0.7822

this age. Still over 50 percent of the total remaining lifetime is spent in the region of birth. For the more mobile regions this proportion has been reduced to below 30 percent.

The variations in the mean expectations of life are also reflected in table 7 which shows the survivorship proportions at age 20 by region of origin and by region of residence. The table gives the information that a person born in the Stockholm region will have a probability of 0.9957 (if a male) or 0.9978 (if a female) to survive an additional 5 years from the age of exact 20 years. The probability is 0.8255 that a male survives in his region of origin (Stockholm that is), 0.0551 that he survives in the region East middle, 0.0146 in the region Småland etc.

Differences in the total survivorship proportions for the eight regions are almost negligible, whereas the probabilities of surviving in the region of origin vary more significantly: from a lowest value of 0.75 in in East middle to a high level of 0.87 in region West.

3.2 *Multiregional population projection*

On the basis of the data presented in the proceeding sections and the assumptions of stability in mortality and fertility, a number of projections of the population in the eight regions

were calculated.

The regional population sharesare presented in figure 1 which gives a long term perspective of regional population growth since the beginning of Swedish population statistics. The projections forecast a break in the trend for some of the regions and for a few others a continuation of previous trends. The change in relative population shares in the eight regions over the 50-year period 1974-2024 is shown below.

Region	Increase	Decrease
Stockholm		-1.27
East middle		-0.48
Småland		-0.38
North middle		- 0.24
Middle north		- 0.12
South west	+0.79	
West	+1.15	
Upper north	+0.55	
In all	+2.49	-2.50

According to the projections presented here "winners" are the regions in southern and western Sweden but also the northermost region Upper north. These regions increase their share of the total population by 2.5 percentage points. All other regions experience a decreasing share of the country's population.

A phenomenon observed in all western countries of today is the so-called aging of the population, which means that the proportion of elderly people is increasing while the youngest age-group is diminishing its share of the total population. In Sweden this can be seen as a steady increase in the mean age of the population. In 1974 the mean age of the total population was 37.6 years with a variation from a low of 36.3 in Upper north to a high of 39.2 in region Middle north. The two northern regions thus had both the youngest and the oldest population as measured by the mean age. The table below also shows the development over the 50-year period up to the year 2024:

Region	1974	2024	Index
Stockholm	36.7	41.3	113
East middle	37.2	41.0	110
Småland	37.9	41.1	108
South	38.1	41.7	109
West	37.6	40.9	109
North middle	39.1	41.7	107
Middle north	39.2	41.9	107
Upper north	36.3	40.1	110
All Sweden	37.6	41.2	110

The mean age of the total population increases to 41.2 years,that is a 10 percent increase,but there is also a strong equalization of mean ages in the regions. The difference between the highest and the lowest mean age is now only 1.8 years as compared to 2.9 years 50 years earlier. Still the two northern regions have the youngest and the oldest populations.

Behind the increase in the mean age of the population lies an increase in the share of older people but also a decrease in the proportion of young people - an aging both at the apex and at the base of the age pyramid:

Region	1974			2024			Change		
	0-14	15-64	65-w	0-14	15-64	65-w	0-14	15-64	65-w
Stockholm	20.4	66.9	12.7	16.2	65.1	18.7	-4.2	-1.8	+6.0
East middle	21.5	64.0	14.5	17.9	62.9	19.2	-3.6	-1.1	+4.7
Småland	21.3	63.0	15.7	18.1	62.3	19.6	-3.2	-0.7	+3.9
South	20.4	64.0	15.6	17.1	62.6	20.3	-3.3	-1.4	+4.7
West	21.0	64.1	14.9	17.7	63.3	19.0	-3.3	-0.8	+4.1
North middle	19.7	63.5	16.8	17.2	62.8	20.0	-2.5	-0.7	+3.2
Middle north	19.6	63.6	16.8	17.2	62.9	19.9	-2.4	-2.1	+3.1
Upper north	21.8	65.3	12.9	18.9	63.2	17.9	-2.9	-2.1	+5.0
All Sweden	20.8	64.4	14.8	17.4	63.3	19.3	-3.4	-1.1	+4.5

The share of the youngest age group decreases by around 3.5 percentage points while the oldest age group (65-w years) increases its share by 4.5 percentage points. This leads to

a net change in the active ages of around 1 percentage point. There is a considerable variation between the different regions, from a low of 0.7 percentage points in region Småland to a high of 2.1 percentage points in the region Upper north, although a levelling out of the share of active ages has occurred.

An excellent example is given by the region Stockholm and Upper north of a similar effect from two different causes: both regions have almost equal shares in the ages above 65 years. The low proportion of elderly people in the Stockholm region is caused by inmigration which is seen from the high proportion in active ages. In Upper north the low proportion of elderly people is caused by a traditionally high fertility level which is seen from the large share of ages below 15.

3.3 *Fertility and migration analysis*

In section 2 of this report, dealing with input data, fertility and migration patterns were discussed to some extent. In this final section only a few additional comments will be added to conclude the presentation of the results from the study.

In the earlier discussion fertility was measured by means of the total fertility rate for the different regions. The multi-regional stable population model makes it possible to calculate

regional reproduction rates which may be seen as age-standardized fertility measures where the influence of mortality differences are eliminated. The regional net-reproduction rate is equivalent to the more conventional net reproduction rate in classical demographic analysis. The major difference depends on the fact that the effect of migration is taken into account, since people who migrate, according to the hypothesis employed in this model, adopt the fertility regime prevailing in the their region of residence. Another feature of the multiregional population model is that it makes it possible to calculate the net edition, for people born in a given region, from all other regions to the region's net reproduction rate (cf. table 8). The official statistics for 1974 gives a value 0.90 for the net reproduction rate. The displacement of the relative share of the regions will have an insignificant effect on the net reproduction rate and the value is equal up to three decimal places. To some extent this reflects the high degree of homogeneity of the fertility in the regions used in this study. This is also seen from the variation in the regional net reproduction rate which varies from a high of 0.87 in the Stockholm region to 0.92 in region Småland. Another observation to make from the net allocations is that women in the two northern regions spend a large portion of their reproductive life outside their region of origin and the same fact holds true also for the region East middle. Women born in region West have the largest proportion of their

reproduction in their region of origin of all regions.

An interesting aspect of regional mobility may be obtained from a measure somewhat inadequately called net migraproduction rate. Since the measure is similar to the total fertility rate, only the effect of mortality excluded, a better name would be net total mobility rate. This measure tells us the average number of moves a person of a given region of birth makes during his lifetime, given that the prevailing mortality and migration regime remain constant during some period into the future. This is equivalent to the assumptions underlying the construction of net reproduction rates.

The same mobility pattern described in earlier sections other measures are displayed once again in table 9.. A person born in region Stockholm or in region East middle makes an average of 1.3 to 1.4 moves during his lifetime and people born in the three northern regions make around 1.2 moves during their lifetime. The least mobile region is West and a person born in this region makes only 0.9 moves during his lifetime. The national average is 1.14 and there is consequently a considerable variation around this average. Generally around 60 percent of the total number of moves are made out of the home regions. Exceptions are people born in the three northern regions who are more mobile outside their home region: more than 40 percent of their total number of moves are made outside their home region.

Table 8 Regional net reproduction rates and percentage distribution

	Region of origin	Region of residence								
		Total	1	2	3	4	5	6	7	8	Total
1	Stockholm	0.87	51.0	13.6	5.4	6.3	7.9	7.3	3.9	4.6	100
2	East middle	0.91	15.4	44.3	6.5	6.8	10.6	8.7	3.2	4.5	100
3	Småland	0.92	7.3	7.6	59.2	9.6	10.8	2.8	1.1	1.7	100
4	South	0.90	7.2	5.7	7.9	64.3	9.2	2.7	1.2	1.8	100
5	West	0.91	6.5	6.3	5.6	6.6	66.8	4.3	1.6	2.4	100
6	North middle	0.89	12.1	12.8	3.4	3.9	10.3	50.6	3.3	3.6	100
7	Middle north	0.88	14.8	9.8	3.2	4.4	7.7	6.8	45.6	7.7	100
8	Upper north	0.91	12.7	9.0	2.9	3.6	6.8	4.5	4.9	55.6	100

Table 9 Regional net total mobility rates and percentage distribution

	Region of origin	Region of residence								
		Total	1	2	3	4	5	6	7	8	Total
1	Stockholm	1.30	61.6	14.9	3.4	3.4	3.9	6.2	3.6	3.1	100
2	East middle	1.41	12.9	62.0	3.8	3.5	5.0	7.0	2.8	2.9	100
3	Småland	1.04	8.5	10.6	61.4	6.6	7.0	3.1	1.3	1.5	100
4	South	0.93	9.4	8.9	6.9	61.5	6.6	3.3	1.6	1.8	100
5	West	0.91	8.8	10.1	5.0	5.2	61.1	5.3	2.2	2.4	100
6	North middle	1.23	11.0	14.3	2.3	2.3	5.4	58.8	3.2	2.7	100
7	Middle north	1.29	12.6	10.4	2.0	2.4	3.8	5.7	57.9	5.3	100
8	Upper north	1.15	12.4	11.1	2.2	2.3	3.9	4.4	5.1	58.5	100

4. REGIONAL POPULATION POLICIES IN SWEDEN

Regional population policies in Sweden have after World War II exclusively been oriented to the economic policies at the macro level. The development of this policy debate was influenced by the surprisingly fast growth of the European economy and its consequences in terms of booming export from Sweden, local commodities scarcities and inflation. The totally accepted Keynesian policies by that time were not developed for this kind of political problems with excess demands for labor in some industries, unemployment in other industries and a fast increase in wages and prices. At that time a group of economists - mainly Bent Hansen, Erik Lundberg, and Gösta Rehn - became involved in the discussion of the conflict between national stabilization policy in structural unemployment. It was realized that a low level of registered unemployment at the national level, coupled with an implied high rate of inflation, was normally accompanied by extensive unemployment in certain industrial sectors, occupations, and regions.

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

wages in the whole economy is proposed, subject to constraints imposed by a maximal accepted increase in prices and a minimal rate of growth of the national product. The negotiated general increase in wages would be rather large, implying a sharply declining demand for labor in certain regions and sectors facing low productivity, and/or low income elasticity of demand in the product market. The government could then act in two ways: it could subsidize the firms in order to prevent shutdowns, and it could increase the sectoral and regional mobility of those people in danger of becoming unemployed.

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

The main goal of modern labor-market policy has been to achieve equality of wages and employment opportunities in different regions. The different regions, thus checking inflation and regional inequality, and the reallocation of capital means that regions with a high level of accessibility and large stocks of capital will have

a high marginal productivity of labor and a better capacity to pay wages at all levels of employment than the more remote regions, which also often lack capital. It is obvious that the marginal employment subsidy to the firms working in disadvantaged regions could attain the two goals simultaneously. The main advantage of the employment subsidy scheme is its quick effect in comparison with subsidies to capital, which have to work through a necessarily slow investment process. Investment subsidies also tend to have a very limited effect on employment because of the lowered price of capital, which in many cases must induce firms to overmechanize. The Swedish forest industries in regions of high unemployment are prime examples of subsidization which has led to excessive mechanization and severe unemployment among all workers specialized in the old labor-intensive techniques.

The consequence of ten years of subsidies to mobility was a huge migration boom from the lagging regions of the north to primarely the booming Stockholm metropolitan region. By the end of the period some political uneasiness with this migration process was realized. And the resistance to the modern labor market policy with its strong arguments and practical policies in favor of the increased internal migration is continuously growing into a decentralization movement. Catchwords like "we wan't move" and "All Must go South" equals AMS (the Swedish Labor Market Board) were used in the public debate on the internal migration policy.

The politicians of Sweden reacted very promptly to the growing critique of the, by many standards, very effective modern labor market policies of the decade 1955-1965. A new system for location policy was set up in 1965 with the explicit goal to experiment with new subsidies to the relocation of industrial firms from the centres of industrial activity to the outmigration areas. The subsidies to capital were in two different forms, location grants and favorable location loans. The development of these loans and grants in the first five-year period is given in the table 10. Theoretical economists soon pointed to the potential inefficiency of subsidies to capital. If there were ample possibilities of substitution in the choice of production technique it was then argued that the lowered price of capital relative to labor lead to excessive mechanization of production in industry. Investment subsidies would thus have a tendency to lead to a higher capital intensity (capital per employed) in areas where labor was abundant and capital scarce. It was argued that a marginal subsidy to employment of labor in disadvantaged (peripheral) regions would have a better efficiency in this respect. A lowered price of labor to the firms would automatically create an inducement to keep the amount of labor per unit of capital high in the unemployment regions. It was also at times argued that such a policy would be more efficient as a means to reduce cost inflation.

REGION	1965/66			1965/67			1965/68			1965/69			1965/70		
	L	G	T	L	G	T	L	G	T	L	G	T	L	G	T
Stockholm	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Eastmiddle	-	-	-	1.5	-	1.5	26.4	-	26.4	37.4	1.0	38.4	40.1	1.9	42.0
Smaland	10.9	-	10.9	16.9	-	-	36.2	0.5	36.7	47.9	3.6	51.5	46.3	3.6	49.9
South	30.6	-	30.0	30.0	-	-	32.6	-	32.6	32.9	-	32.9	32.0	-	32.9
West	35.3	8.6	43.9	69.4	11.2	80.6	81.6	11.1	92.7	91.8	12.0	103.8	111.6	13.2	124.8
Northmiddle	84.7	27.0	111.7	97.6	25.2	122.8	162.8	34.7	197.5	258.0	50.9	308.9	295.9	63.2	359.1
Middlenorth	39.8	15.9	55.7	90.1	15.9	106.0	130.0	32.8	162.8	175.5	44.4	219.9	244.5	54.8	299.3
Uppernorth	62.9	33.3	96.2	76.1	35.5	111.6	98.4	51.1	149.5	116.4	69.1	185.5	138.9	79.3	218.2
Total	162.6	84.8	347.4	381.8	87.8	469.4	568.0	130.2	698.2	759.9	181.0	940.9	910.2	216.0	126.2

L: Loan G: Grant T: Total

Table 10: Government Location Support 1965-1970.
Cumulative Distribution in Thousands of Kronor (Swedish).

Note: time period is from 1.7.1965 to the end of the given year except for the last column which covers the five-year period 1.7.1965 - 30.6.1970.

Although the acceptance of these theoretical arguments at the political level were slow in comparison with the acceptance of location subsidies it has become more or less a standard part of regional and age-group oriented labor market policy in Sweden.

The first five year period of location policy was transformed into a more generally oriented regional policy with the beginning of the 1970s. It was then argued that the early experiments with location policy, although somewhat successful, had been too narrow in scope and too limited in its extension to regions and industries. It was argued that there must be a whole set of goals including one that would be primarely focused on a balanced population distribution between different parts of the country and different size groups of the rank size distribution. The different counties were given explicit population goals and the rank size distribution was subdivided into four size groups, each one with its own basic regional policy instruments and associated quantitative or qualitative goals to be attained.

The new regional policy in the 1970s was supplemented with some new means. A major instrument of the new regional policies was relocation of central government institutions and their staff.

It has been argued that there has been a reversal in migration flows as a consequence of location and regional policies from 1965 to 1977. It is obvious that regional policy has had certain effect in this respect. It can however be argued with some force that the current stagnation or decline of metropolitan areas is such a world wide phenomenon that it can not be attributed to policies tried in small set of countries. It is clear that the stagnation and even decline of certain metropolitan areas coincides with the emerging of a new business cycle pattern in the world economy. It is consequently a matter of great importance to devote new research efforts to the question of long term and short term interactions between internal and international migration, economic growth and fluctuations.